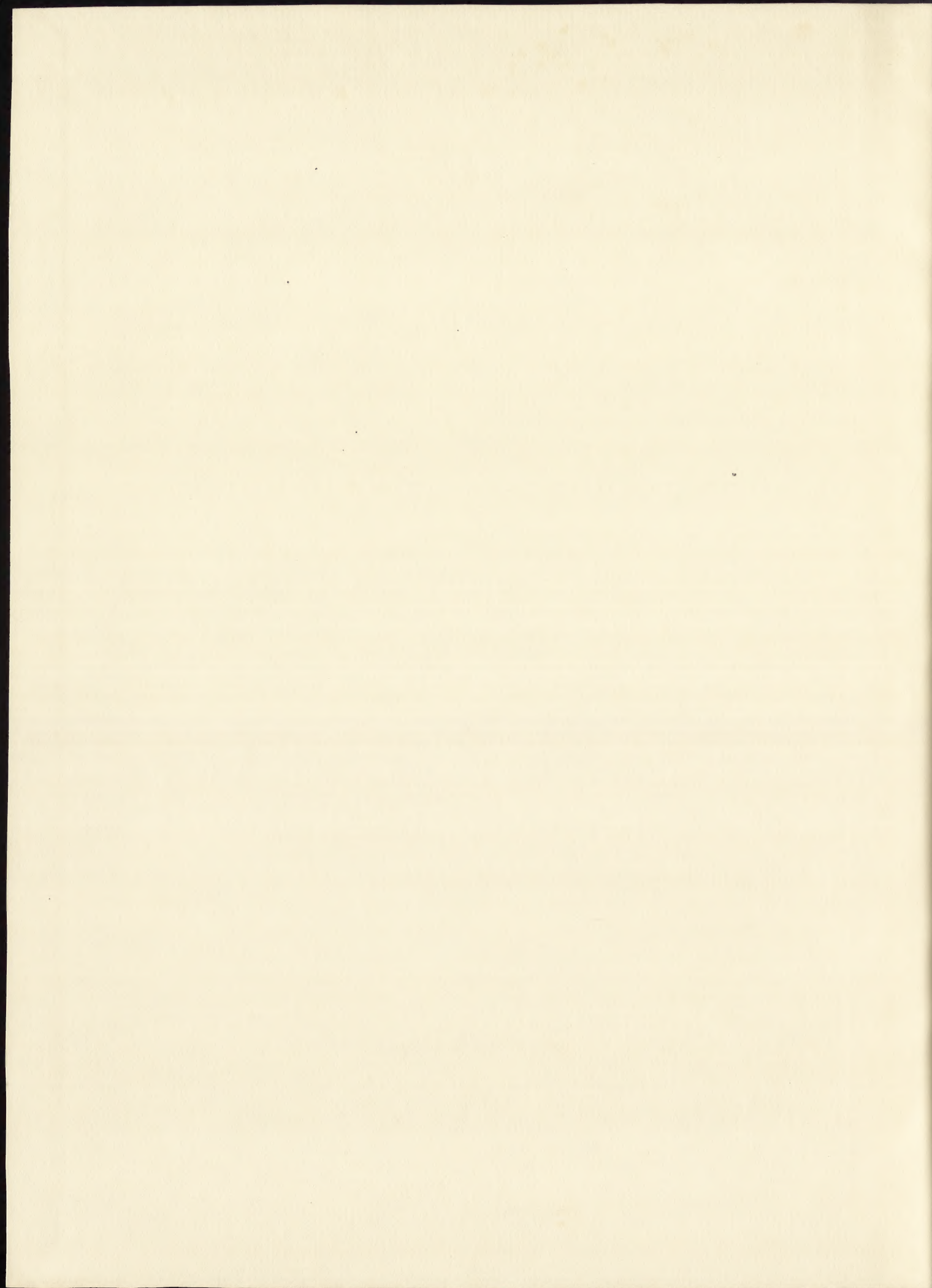


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Royal Institute of British Architects.

INCORPORATED IN THE SEVENTH YEAR OF WILLIAM IV.

TRANSACTIONS: VOL. II. NEW SERIES.

FIFTY-SECOND YEAR OF FOUNDATION.

USUI CIVIUM, DECORI URBIUM.

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TRANSACTIONS: VOL. II. NEW SERIES.

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"labouring oar. He has laboured steadily at that oar, and I trust and believe that "he has rowed us into a good harbour."

Gentlemen, I shall not, on this occasion, attempt to pourtray the events of the life of our departed friend; that is a pleasing task I must leave to others. There have been many notices of his career, and Mr. Godwin, as you know, has given us a sketch of much interest, which renders further comment from me the less needful.

Our friend has left us, gathered to the great harvest like a sheaf of corn fully ripe, surrounded by all those things which should accompany old age, as "honour, love, "obedience, troops of friends," bequeathing to us the fresh green memory, and the bright example of the kind and courteous Christian gentleman, the enthusiastic lover of his Art, and the honoured and honourable architect; and what more can I say, or what more would he have wished to be said of him, than "let me die the death of the righteous, and "may my last end be like his."

The venerable Professor's death occurred at a time when many members were out of town, consequently, although 1,000 letters were despatched on the afternoon of the day on which the intelligence was received, few comparatively were able to obey the summons and be present at his burial, but those present were, I am sure, all earnest mourners of departed worth.

On behalf of the Council, I addressed to the family shortly afterwards, a letter of condolence, but you will doubtless desire that one from the whole body of our members should also be sent, and the Council will be ready to transmit any resolution that may be arrived at on this subject.

Before dismissing this matter wholly from our minds, let me say a few words further, not so much on the personal man, but on the character of his studies.

It has been said that there will never be another Donaldson. Possibly, as regards intense zeal for the welfare of this Institute, we "ne'er may look upon his like again," though I hope the contrary; but as regards the study and culture of the individual architect, surely it is to be hoped that such men as he will still be found in our ranks. Sad indeed would be the prospect if it were otherwise; but when we call to mind, as we may easily do, the numerous examples in our own time of the value of prolonged study, have we not good reason to hope, that the future will not prove to be so barren as such a prophecy might lead us to expect, and that not only the genius, but the ability to wait, may still be found to meet this necessity of our Art, if it is to be practised in its full development.

Other losses by death I shall refer to later on. That of our Past President, Mr. Whichcord, was sorrowfully recorded in January last, but it is I think the first time in our history, that two Past Presidents have left us in the course of a single year.

THE PROPOSED NEW CHARTER.

As regards the future, you will probably remember that, at our Opening Meeting of last year, I alluded to the necessity of some change in our constitution to meet the requirements of this later time; and it is I think remarkable, that the death of the

founder of the Institute should have coincided so nearly with the issuing in a completed form of the proposed new Charter, which the Committee appointed for the purpose of considering the subject have presented as the result of their labours.

As a print of the document has been sent to each member of the Institute, and as a Special Meeting will shortly be called for its consideration in detail, it is hardly necessary for me to do more than glance at one or two of its principal provisions.

Few human works can be called perfect, and we cannot therefore expect to escape criticism; but as I hope no one amongst us, any more than the members of the Council, has any desire except that of obtaining for the future of our Institute the best government possible, and the greatest freedom of action practicable within reasonable limits, I trust the subject will be carefully considered by all of us, and in the judicial spirit which alone is likely to conduce to the desired end.

We have been told that the result of the change will be to give greater power to the Council; but a government to be worth anything at all ought to be strong; and, with a greatly enlarged constituency, surely the ultimate decision of any important question must be that of the whole Body of members, and, rightly given, ought to be generally satisfactory.

We have been asked also why the By-laws which are to determine so much important action have not been issued with the Charter itself, but it is a golden rule of business to do one thing at a time, and the Council are of opinion that the principles of action should be first agreed upon, and the settlement of details may follow afterwards.

Probably the most important provision in the proposed new Charter is the extension of the examination test to all classes of professional members, except under circumstances and in cases, in which the Council may determine otherwise. I think we must all see that that requirement is an inevitable consequence of the obligatory examination of Associates, and must ultimately tend to the strengthening of our Body. That there must nevertheless be exceptional cases is also inevitable, and it is in my judgment not undesirable that so it should be.

There will, I trust, always be some exceptional men, deep students and real artists, to whom the ordinary rules of examination cannot apply; men of genius to whom solitude is the nurse, who may not see with our eyes, but whose presence amongst us would necessarily be welcomed; men who, having proved their power, could not be asked to submit to ordinary rules. There are such men now, and there may be more in the future, and it would be for our welfare to include them all amongst us.

As regards that important section of our Body, the Associates, the extension of the power of voting is a right and necessary change; and it is to be hoped that by this, and the alteration in the method of recording their votes which the new Charter will give the power by by-laws to prescribe, the provincial members may be put on that footing of equality which has so long been desired, and to which, under the provisions of the old Charter, it was found impossible to attain.

As to other matters, it is hardly necessary to occupy your time with further observations, but such radical changes as those to which I have alluded, could not be passed

over without remark ; and although the question of internal government is undoubtedly important, there is something beyond, and still higher, which it behoves us to consider.

ARCHITECTURAL EDUCATION.

The opinion I expressed last year on the subject of the education of the architect, I have long held, and have not yet seen reason to change ; but although I have not been able to discover how this Institute is to become an educating, as well as an examining Body, I see no reason why we should not do more than has hitherto been done, for facilitating the attainment of knowledge by those who really desire to possess, and have not the means of otherwise acquiring it.

Architecture is essentially a science of observation. Its theory and history may be learnt from books, and in office practice and other teaching ; but unless these are supplemented by the careful study of buildings at home and abroad, education cannot be really said to be satisfactorily completed.

Would it not then be within our province, as I trust it may also be found within our means, to do more than we have hitherto done, in establishing travelling scholarships as prizes for young men who have distinguished themselves in passing our examinations ; supplementing, but also enlarging, the scope of what we already possess in the Soane and Pugin prizes, and the Godwin Bursary ? Scholarships I mean for the promotion of real and prolonged study in such paths of our diversified Art as may be most congenial, and at the same time the best adapted for advancing that knowledge, which our Charter proclaims to be the great object of our existence.

Our ranks have to some extent, in the last few years, been recruited by men who have passed through the educational course of our universities ; let us hope that in the future they may be still further leavened by such well-trained students, for nothing surely is of more importance than that the preliminary education of the architect should be as thorough and complete as it can possibly be made, nor can there I think be anything more valuable, for raising the general level of professional attainment.

Nothing of course will atone for want of general aptitude and artistic feeling ; but in my judgment, the additional time expended on the University course, provided it be well employed, is of more importance to the future of the architect—supposing such genius or aptitude to exist—than the same time spent in any other way. May we not hope that the advantage of this early education may be more fully exemplified amongst us ? and combining with this our English system, I do not fear the future of our Art.

There is much indeed in what one sees about us to make us mourn, but there are not wanting many hopeful signs and sources of rejoicing in good work now being done amongst us. Englishmen are apt to decry and depreciate the works of their own countrymen, and it is hard to obtain favour for contemporary work at any time ; but there is much done unknown to the general public which proclaims the fact, that architecture in this country is by no means that dead and spiritless thing that some would have us to believe.

That we cannot revive the grand old times of originating genius is a fact to be deplored ; but neither can we change the character of our age ; though we need not

despair of inspiring it with fresh ardour in the search for the beautiful, and the execution of that which will live, and be duly valued in the future.

And now, Gentlemen, without dilating too much upon our own proceedings, I think I may say of the preceding Session, that its record as given in the last volume of *TRANSACTIONS* is one of considerable and varied interest. Mr. Stannus's paper on the internal treatment of cupolas, and the discussion which followed, showed very conclusively the great difficulty of the subject; and as regards the task of completing the work of the great Master architect of our Metropolitan Cathedral, the almost hopelessness of arriving at a conclusion that shall be generally accepted as satisfactory. Certainly it is a subject worth any amount of preliminary study and cost that may be bestowed upon it, and whether the work be finished in our generation or the next is comparatively a matter of minor importance.

Our Associate, Mr. Lawrence Harvey, did good service in bringing before us the highly suggestive work of Professor Semper, refreshing us with thoughts from abroad on a subject undoubtedly of very considerable importance to the progress of our Art.

Mr. Farrow's essay, as the Holder of the Godwin Bursary, was an excellent illustration of the great advantage to our younger members arising from the wise and thoughtful provision of its founder.

It is hardly necessary for me to say a word as to the paper contributed by Mr. Maurice B. Adams on architectural drawing, nor of the magnificent collection of beautiful and interesting drawings by which it was illustrated: that evening must be fresh in the memory of us all, and it is to be hoped that lessons may have been laid to heart by many young men, who may help to increase the volume in years to come.

As a combination of practical and artistic work in a subject of much freshness and general interest, the modest, but very excellent paper on flint-work, by Mr. Baggallay, was an illustration of thorough good work, which I trust he will follow up hereafter; and last, though certainly not least of general Sessional papers, I need hardly call to your remembrance the learned and very excellent paper by our Fellow, Alexander Graham, on remains of the Roman occupation of North Africa, a subject of great and abiding interest, on which we shall, I am sure, most gladly welcome any further contributions with which he may be willing to favour us. Mr. Graham's paper was, as you know, profusely illustrated by many beautiful drawings and sketches, and our annual volume is greatly enriched by these, and others I have not particularly mentioned.

I think there is in this brief notice of papers much to encourage us.

In my former address I said, "Are there none of our younger brethren anxious to show what they can do; and would it not be good for them, and useful for us, that they should take the opportunity offered by our meetings of testing their powers?" And is it not a hopeful sign, and does it not fully justify our proposed action in respect of the Charter, that eight papers out of eleven, all more or less valuable, should have been contributed by Associates? Truly, I think so, and I rejoice in the fact; and, while I would congratulate our younger brethren on the fruits of their ardour, I would ask, ought it not to stimulate their elders, not to imitate, but, from their more extended

knowledge and mature experience, to put before us from time to time the fruits of such researches as those of Mr. Graham.

To some of us, immersed as we are in the active pursuits of our laborious profession, we know that it is impossible ; but I would fain hope there are still amongst us men of learning and some leisure : Ashpitels, Sharpes or Donaldsons or Grahams, who may be stirred to activity by this wholesome rivalry of younger men.

The record of the work of the past Session would be incomplete were I not to refer to its closing Meeting, when we had the pleasure of welcoming the great explorer, Dr. Schliemann, and presenting to him the Royal Gold Medal, of which you had unanimously voted him to be a worthy recipient. I have reason to know that the satisfaction was mutual, and that not only in this room, but subsequently, Dr. Schliemann expressed the great delight that his reception amongst us had afforded him.

Nor must I allow the proposal of Professor Kerr to pass unnoticed. We all know how jealous our friend is of the honour of this Institute, and how anxious that its operations should be extended wherever it may be usefully done. We may not all agree with him in what he desires to accomplish, and I, for one, cannot concur in his proposal for the alliance with noble patrons, because I think, with all due respect, we have, as a corporate Body, passed that stage of development, and shall do better to trust to ourselves ; but nevertheless, I highly appreciate his wish for general improvement in our action, and shall be always ready to support whatever well-considered measures may be practicable for advancing this result.

WESTMINSTER HALL.

Amongst subjects that have interested not only architects but society generally, is one that has excited much keen controversy, and on which you will doubtless expect me to say a few words. Last November I said in respect of the appointment of a Committee of the House of Commons to consider Mr. Pearson's plans and report, "I think in this case the action of Parliament is hardly to be regretted, if it gives further time for the consideration of a subject of unquestionable difficulty, one which deeply concerns all who care, as we should do, for the preservation of our ancient monuments;" and, as regards the thorough sifting of the case, I think good has been done by eliciting opinion from all sides ; though as regards the architect chiefly interested, it has been a somewhat fiery ordeal, which however he has happily survived.

It is no part of my business to uphold the decision of the Committee, though in the main I think it was right ; but I must confess to much astonishment at opinions that have been expressed on the one most important point of substantial repair. How it could have been seriously said that the great buttresses should have been left in their sadly dilapidated state to moulder away into ruin, while the Hall itself was to be preserved, I am at a loss to understand ! Westminster Hall is, and I hope will long remain, a living building, one of the noblest in the land ; one of which no Englishman can be otherwise than proud ; one that it is our bounden duty to maintain ; and I think that the late First Commissioner of Works did wisely when he appointed our

Fellow, Mr. Pearson, to carry out the work so urgently needed for its preservation. We may not agree with every detail of what he proposes to do ; but is it just, is it generous, to criticize in the way that has been done, the work which he, as a thoroughly scientific and practical architect, pronounces to be absolutely needed for the maintenance of this grand historical monument ? Personally I regret that Mr. Pearson's proposal for raising the towers is not to be carried out, but I cannot do otherwise than rejoice that the Hall is still to remain open to view. It is to be hoped that in the near future, the lead may be restored to the roof, and the poor turret now standing may be replaced by a *flèche* more worthy of the grand and beautiful proportions of the finest piece of timber framing of which this country is possessed.

THE TOWER OF LONDON.

Of similar works of restoration that have been in progress during the past year, and the further work in prospect : those at the Tower of London are probably not the least interesting. Considering the national importance of that great building, and the special knowledge required for its proper treatment, it would be satisfactory to know that advice had been asked from those who, having long studied the subject, may be best qualified to afford it. This may have been done, and I trust it has, for it would be much to be regretted if work of this kind were not to be carried out with all the accuracy which only very few specialists can be expected to possess.

PETERBOROUGH CATHEDRAL.

Another subject, interesting alike to ourselves and to the artistic and antiquarian world in general, about which controversy has raged so fiercely, that the aid of an archbishop had to be sought in order to settle a question which might, one would have thought, have been safely left to the architect to solve, is the restoration of the tower of Peterborough Cathedral. I should occupy too much of your time, were I to attempt to traverse the ground which so many have trod, but I think it is to be regretted that Mr. Pearson should not have been allowed to act on his own matured judgment ; and, with the most profound respect for the archbishop's opinion, I cannot but think that the rebuilding of arches of later date, interfering with the original design of the Norman arcade, which had once a reason, but now will have none, is a requirement of the letter, rather than the spirit, of correct restoration. As to the upper part of the tower, opinions must and will differ ; and the solution agreed upon is undoubtedly *safe*, but personally I should have preferred to see Mr. Pearson's fine design for rebuilding completely carried out.

THE ADMIRALTY AND WAR OFFICES.

As regards the new Public Offices, not much advance appears to have been made. The model recently exhibited has drawn forth many strong expressions of opinion, and some useful criticisms ; but others might have been spared, had it been entirely accurate and accompanied by explanatory plans and sections. Surely it was worth while, more especially in a case like this—one of so much importance to the future of London—to have made an entirely new model, instead of exhibiting lines of roadway and buildings no longer existent, and omitting others all important for proper comparison with the

proposed new buildings. The model may have been useful in showing to the public—what has long been the opinion of many architects—that the site is insufficient for the buildings proposed to be put upon it. But for any supposed deficiencies resulting from that cause, the architects whose plans have been accepted are of course in no way responsible, and I cannot but think they have been subjected to some unfair criticism, which more careful consideration would have shown they did not deserve.

Larger courts and more through-openings would no doubt be valuable, but when a certain amount of superficial area in internal accommodation had to be provided, and all the requirements of structure to be substantially met, the difficulties of the task were enormous, and the result as good as, under such circumstances, could reasonably have been expected. It may nevertheless be useful to state—what I am assured by the architects is an exactly ascertained fact—that within the external lines of each site, the superficial area of courts provided by the plans, as compared with that covered by building, is larger in this case than in the Palace of Westminster, or the Royal Courts of Justice ; and but very little less than that in the new Foreign Office, but this is of course irrespective of any question of height or distribution.

It is one of the misfortunes of our densely crowded city, that space is so valuable as to forbid much lateral expansion, and as a consequence what is wanting in breadth has to be given in height, which in a climate like ours involves a serious interference with air and sunshine. Height is no doubt an element of grandeur in architecture, but if unaccompanied by surrounding space, it may become a serious evil.

When engaged in the examination of the plans for the new Offices, I represented to the judges the seriousness of this consideration in respect of the frontage next Whitehall, where the roadway is narrow, and the building proposed very lofty. In the revised plans the difficulty has to a certain extent been met by recessing the main front about 30 feet, but it will not wholly remedy what, to my mind, is a defect of considerable importance, which could only be completely remedied by a considerable extension of area. What the difficulties may have been in obtaining more space, and especially the frontage towards Charing Cross, at present, with the exception of the Banks, occupied by such comparatively low mean buildings, I am unable to say ; but I think it is much to be regretted that when an important work like that now contemplated, and one which ought to be a great Metropolitan improvement, had to be effected, the additional land was not secured, however large the cost might be. Surely in view of its vast importance to the future of London, the right solution of this question, in an imperial, rather than a merely financial sense, is a thing much to be desired, and one that this Institute would do well in endeavouring if possible to promote.

THE NEW BRIDGE.

I think it must be gratifying to all of us, that for the new bridge proposed over the Thames, the design of our Past President, Horace Jones, has been accepted for execution. We may all be grateful that London Bridge is to be left untouched in its noble simplicity ; and that to our brother architect has been committed the far more congenial task of designing something entirely new. Mr. Jones has favoured

me with a sight of the general design, and a brief description of the construction to be followed ; but it is obviously to be a work of so much importance and interest, that it would be wrong for me to attempt in this Address to describe it in detail ; and I gladly forbear to do so, in the hope that our friend may one day give us something much more valuable than I could presume to put before you on an evening like the present.

I may however say this much, that the design in its general outlines is strikingly original in character, and as regards the towers, affords the architect a rare opportunity of rivalling in massiveness and simplicity of structure, the great works of antiquity which no one can contemplate without satisfaction and delight.

Mr. Jones further informs me that an Act of Parliament, authorizing the Corporation of the City of London to erect this bridge was obtained, after a contest lasting nineteen days before a Committee appointed by the House of Commons, and seven days before a Committee appointed by the House of Lords.

Mr. John Wolfe Barry was the civil engineer, under whose advice application was made to Parliament, and his skill, talent and experience contributed in no small degree to the success of the Corporation in obtaining the Act.

HAMPSTEAD HEATH EXTENSION.

On subjects not immediately connected with architecture, but of serious importance as regards the healthfulness and beauty of our vast, and ever growing Metropolis, I think it may not be out of place to notice the movement that has been set on foot for the acquisition of land for a North Metropolitan Park, supplementing, as it is proposed, in a very necessary way, the original purchase of Hampstead Heath by the Metropolitan Board. Possibly few people, except those who have studied the subject on the spot, and have watched the ever-advancing tide of bricks and mortar, have realized what a terrible loss it would be to the northern side of London, if the tract of undulating and beautifully-timbered land between Hampstead Heath and Highgate, including the historical mound of Parliament Hill, were delivered over to the speculating builder. Many years ago our first professional President, Professor Cockerell, proposed a plan which, if it had been adopted, would have made a noble approach to a beautiful suburb ; but that, like many another fair proposal, was thwarted, and finally dropped. Mr. Cockerell's plan was published in *The Builder* of July 2nd 1853, and accompanied by an excellent editorial article, from which I quote the following passages. The editor said :—

“The effect of parks and pleasure grounds on the health, the manners and the “happiness of a great metropolis has been wisely felt and distinctly recorded from the “earliest times ;” and of Hampstead Heath that “it is one of the loveliest spots in the “kingdom ; and we would aid those who are seeking to keep it in its present state, for “the health and delight of the people.

“Cold must he be who ever gazed

“Impassive on its beauty

“If we make a circuit around the rapidly increased suburbs of the Metropolis, we can “find no spot concentrating so many advantages for a public park as Hampstead Heath ;

"indeed, it is unique, and may challenge the great cities of the world for a parallel suburb. " Its height—no less than 425 feet above the Thames—commands views extending over " the vast Metropolis from east to west, to Shooter's Hill on the one side, and, on the " other, to the Surrey and Berkshire Hills, embracing Windsor Castle, and an intervening " country of surpassing beauty and variety, and proverbially healthy.

" Its sandy soil, of vast importance in our humid climate, insures at all times a " dry and healthy recreation ground, and in accessibility to all classes from all parts " of London it is unrivalled already, and the projected lines of rail from the east of London " will render it still more convenient.

" It has long been the school for landscape artists. It is to London what Fontainebleau " is to Paris, and the extent to which its picturesque beauties, undulations, and the " wildness of the Heath are enjoyed by the humbler classes on Sundays and holidays " is refreshing to behold." Thus far, the editor.

But Hampstead Heath, on the side next London, without the acquisition of the adjoining land to which I have alluded, would be deprived of almost all the beauty so eloquently descanted on by the editor. It would, in fact, become a mere narrow strip of brown grass shut in by houses on either side ; and this is the part which, more than any other, is the people's recreation ground. The scheme now before the Metropolitan Board is entirely practicable if only the cost of it can be met ; and it has, I believe, been clearly shown by experts that it *can*, without imposing any appreciable burden on the general community. Looking to the future of this Metropolis, it is one of such vital importance for the health and recreation of toiling multitudes, that it is to be hoped it will be viewed by the Board, not as a mere local matter, which in no sense it is, but, as it is in truth, one of Metropolitan, not to say National importance. Anything that concerns the healthfulness and beauty of our great city ought to be a subject of interest to us as architects, and for that reason, as for others, I think this movement is quite worthy of the sympathy and support of this Institute.

ARTIZANS' HOMES.

Another subject, akin to this in one sense, has occupied much public attention during the passing year, one of vast importance to the well-being of the commonwealth, but by no means easy of solution — The housing of the Working Classes. One considerable difficulty as regards artizans connected with building, is the migratory nature of their employment. Men must live near their work or lose much time and cost in getting to and fro, and this must needs interfere with the occupations of a settled home, so conducive to the comfort and general happiness of life, and it is one that cannot well be met by legislative enactments. But the roving tendency is not confined to artizans, and with others as with them, it produces similar results. The most serious matter, however, is the condition of the houses inhabited by the very poor. Sad it is to contemplate, and most seriously difficult to devise a remedy. As regards provision of buildings, much may probably be done by architects who have the charge of estates ; but the other difficulty is far more serious, and will require the highest wisdom in social

questions effectually to grapple with, what is not only a difficulty, but one which involves a serious danger to the State. It is to be hoped that much good may result from the investigations of the Commission which has recently presented its report, and of which amongst others, our Fellow, Mr. Godwin, was an active member. Few, if any men living have done more than he in persistently working on this subject, to which to his honour be it spoken, he was one of the first to draw the public attention. It is a subject for architects to ponder, and therefore not I think out of place in an Address to the Institute.

As regards our Colonies, we have lately entered into relations with the Auckland Institute of Architects (New Zealand), founded in 1880 on the lines of our own Body, which I trust may bear fruit in the future; and with Mr. W. W. Wardell of Sydney, the Honorary Secretary for Australia, our communications are very frequent.

OBITUARY.

It is each year a sad necessity to record the losses sustained by death, and I have already spoken of those of men pre-eminent in their connection with our Body. There are unfortunately more to be mentioned, some of whose names were well known, and though others may have been less familiar, it is not right they should be left unnoticed.

George Alexander will only be remembered by few, having early retired from practice to the enjoyment of the life of a country gentleman on his estate in Wiltshire, but in his younger days he was well known as a successful architect, and he was, I believe, a friend of Professor Donaldson.

Of Matthew Ellison Hadfield, a name of power in the Midland counties, we have already taken note; and the same may be said of Richard Makilwaine Phipson, in the Eastern district, a man sorely missed by those amongst whom he practised.

John Middleton, of Cheltenham, one of the kindest and most genial of men, was an excellent architect, an artist and antiquary, some of whose works display, in combination with sound construction, a freshness of design which is always grateful to those who can appreciate good work. His son is still amongst us, and we hope may long continue a labourer in the more special field he has chosen for himself.

I am sorry also to record the very recent death of Frederick W. Ordish, of Leicester, an architect of no mean power, formerly associated with that able man, John Johnson. His works were not numerous, but there is much originality in all that I have seen of them, and some which distinctly show the hand of a master of his craft. Mr. Ordish met his death in attempting to enter a train in motion; a warning to all, far too often unheeded.

To complete the list of professional members there remain also the names of John Holloway Sanders and William Thompson, Fellows; Alfred Bevan, Edward Early Hollis, Frank Johnson, and Herbert Edward Tijou, Associates.

We have also lost an Honorary Fellow, Edward Akroyd, of Halifax, who was elected in 1865, and at whose sole cost a fine church, designed by the late Sir Gilbert Scott, was built in that town.

In the ranks of Honorary Associates the hand of death has also unfortunately been busy. In Lord Houghton we have lost a most accomplished man, a poet, and lover of

art; in Sir Watkin Williams Wynn a magnate of the social world whom we could ill spare; and Henry Andrewes Palmer, and Henry Simmonds. Lastly, of Honorary Corresponding Members we have also to regret the loss of Théodore Ballu, of Paris; Heinrich Dehn-Rotfelser, of Berlin; and Lysandros Kaftangioglou, of Athens.

It is a natural sequence of our obituary that I should record the receipt of a legacy of £19 19s. from Charles Henman, whose death I mentioned last year, but although legacies are valuable, and to be thankfully received, it is a more agreeable and promising subject of congratulation to speak of gifts from those who remain amongst us, and in which the present year has not been unfruitful. It is not many, probably only very few of us, who can afford to make such acknowledgments of professional success as that of our friend, David Brandon, on retiring from office as Vice-President. But such gifts are none the less gracious because they are rare, and it is to be hoped in the future that his valuable example may teach others to do likewise.

Mr. Aldwinckle's donation for one year for encouraging travel in Italy is a hopeful sign; and the graceful act of the Misses Jones in endowing a scholarship for the study of coloured decoration, in memory of their lamented brother, that great master of the Art, is one for which we may be truly grateful, and, it is allowable to hope, will keep his memory green in the minds of many yet to join our ranks and participate in its benefits. Opportunities are constantly occurring for the disposal of such gifts, and they may all be made to tend to the essential object of our existence—the advancement of the knowledge of the Art we profess.

Finally, Gentlemen, it is I think, indisputable, that as in the body politic, so with us; with the enlarged franchise must come increased responsibility, and I would fain remind our younger brethren, the Associates, so full of fire and zeal for the higher work of the Institute, that its future must rest with them; and if I may again, and with a difference, quote my own words, I would say, that as the aim of its founders was high, so let their standard be raised still higher; the work which their predecessors commenced in weakness let them continue in strength; and, disregarding all mean and petty jealousies, let them labour, not so much for their own material interests, as for the true and loyal promotion of the great Art which they profess, and the maintenance of that high and honourable character which it was the great object of our founders to establish.

Let them, in the words of the poet, be like

“ The youth, who bore, 'mid snow and ice,

and died
“ A banner with the strange device,

“ Still grasping in his hand of ice,

“ That banner with the strange device—

“ Excelsior !”

EWAN CHRISTIAN.

* * A vote of thanks to the President for his Address was moved by H. H. Statham, *Fellow*, and seconded by Hugh Leonard, *Hon. Associate*, whose speeches are given in full in the Journal of PROCEEDINGS, Vol. II., N.S., pages 13-15.

XIII.

LONDON AS IT IS AND AS IT MIGHT BE.

By WM. WOODWARD, *Associate*.¹

[Read on Monday, 16th November 1885, Ewan Christian, *President*, in the Chair.]

IN the observations I am about to make, it will be found that a considerable portion is taken up in complaining of matters as they now exist, but I will ask the Institute to believe that it is in no hostile, carping or hypercritical spirit that I have ventured to bring forward so great a subject. My only desire is that if there be room for improvements, and it is possible to secure them, the attention of the proper authorities may be invoked and the whole community benefited, even if to a comparatively small degree.

The salubrity, convenience of transit, and the artistic embellishment of the Metropolis concern every Englishman, and, indeed, the whole world, but they more deeply concern the dweller and worker in London. To them loss of time, loss of patience, and loss of health, are matters of intense interest, and as the population of London increases to the extent which we know; as the supply of existing dwellings becomes unequal to the demand; as the vehicular traffic pours day after day its reply to the expressed want; and as the thoroughfares through which it passes have not correspondingly widened or increased, it is quite certain that some considerable additional provision for all this increase must shortly be made, and it is equally certain that what was sufficient for a population of two millions is quite inadequate for one of between four and five, extending its numbers day by day.

We are thus brought face to face with a fact; we have not the advantages of a large area of bare land on paper, upon which we may sit down and design a grand city from its foundations, regardless of cost, vested interests, disturbance, and powerful opposition; but, on the other hand, we have a city so advantageously situated, so lending itself to improvement, and so wealthy, that now that some vast change in the convenience

¹ Mr. Woodward was awarded one of the three Prizes of £100. given this year by Mr. William Westgarth (through the Society of Arts) for the best Essay on "The Sanitation and Reconstruction of Central London."

and sufficiency of communication, in the dwellings of the people, and in the administration of the laws which govern London is absolutely essential, we may, I think, approach the subject as one which, in whole or in part, must sooner or later be taken in hand by the Legislature.

Considering the matter in this light it will not be necessary to enlarge upon the origin or foundation of the city, whilst it may not be out of place to briefly consider what London was immediately before and after the great fire of 1666; what it is in this year 1885 after the exertions of its constituted authorities; and then what it might become by the improvements which I suggest in this paper.

LONDON BEFORE THE GREAT FIRE.

A glance at a plan of London, of even fifty years ago, shows the enormous strides which building operations have made in spreading the area of this great Metropolis, indeed the surprise is almost as much as that which is felt in comparing the London of Queen Elizabeth with that of Queen Victoria. What was, in the former reign, field and garden, is now an almost solid compact mass of human habitations; then, with the exception of a few buildings dotted here and there, all was open space from Lothbury to the Tower. Whitechapel consisted of a few houses only; Goswell Street was called the "road to St. Albans." With the exception of Cowcross and part of St. John Street, Clerkenwell was chiefly occupied by the monastery and church; from the back of Cowcross to Gray's Inn Lane, pasture and garden ground held sway, as it nearly did to the "Village" of St. Giles, which had then good right to be called "in the parish of St. Giles in the Fields." Beyond, to the northward and westward, all was country, "Oxford Road" having trees and hedges on both sides. Even in 1778 a German writer, describing the Metropolis, speaks of Tyburn (the place of execution at that time) as being "distant from London about two English miles," and the same might have been said, with equal truth, of surroundings of equal distance, at other points of the compass. The Strand then was, on the south side, formed of the mansions of the nobility and prelates, the gardens running down to the Thames, on whose (perhaps then silvery) waters barges carried their noble owners to the Court at Whitehall.

On the Surrey side of the Thames there were but six or seven houses from Lambeth Palace to the shore opposite White Friars; opposite to Queenhithe were the circular buildings appropriated to bull and bear baitings, which Elizabeth often witnessed. London Bridge was crowded with buildings; along Tooley Street to Horsleydown was much built over, and after that only a few houses and gardens appeared. When the Earl of Burlington was asked "why he built his house in Piccadilly so far out of town," he answered, "because I was determined to have no building *beyond me*," and the authorities in the days of Elizabeth betrayed curious anxiety to prevent the increase of buildings beyond *them*, by which means they thought to check the growth of a population which might be inconvenient; and, strange to say, under the Commonwealth, a similar proclamation was issued with the reservation, however, that the Earl of Bedford might build Covent Garden, and that Long Acre, Lincoln's Inn Fields and Clare Market might

force themselves into existence. The result of such proceedings might have been anticipated; it was easier to check the growth of buildings than it was that of the population; the houses of the poorer classes were therefore crowded to such an excess that disease and pestilence several times occurred. In 1603 upwards of 30,000 persons died of the plague in London; the authorities were alarmed, all precautions were useless, at last the building area was extended, and extension has been the word ever since.

In the reign of Charles the Second (1660) the sanitary condition of the Capital must still have been a subject of anxiety; the attention of the Legislature was directed thereto, and Acts for paving and lighting the streets, and widening the avenues were passed. These, however, did not prevent in 1665 the "great plague" which carried away 100,000 souls; a dire calamity followed by an effective cleansing in the form of the "great fire" on Sunday, 2nd September 1666, which consumed within the walls almost five-sixths of the whole city, or equal to upwards of a mile in length, and half a mile in width.

The ruins of the city were 436 acres, viz., 373 acres within the walls, and 63 in the liberties of the city; of the 26 wards it utterly destroyed 15, and left 8 others shattered and half burnt; it consumed 400 streets, 13,200 dwelling-houses, 89 churches besides chapels, four of the city gates, Guildhall, many public structures, hospitals, schools, libraries, and a vast number of stately edifices, and, according to the best estimates which could be made, the value of the property destroyed amounted to £10,000,000 sterling.

LONDON AFTER THE GREAT FIRE.

If ever a golden opportunity was lost, it was when, through blundering which, to some extent, similarly exists at this day, the rebuilding after the devastation caused by the fire was permitted to be carried out regardless of any systematic plan commensurate with the exigencies of so important a city. It is true that an Act of Parliament was passed for the rebuilding, but it would appear to be easier to pass an Act than to secure skilful compliance with its intentions. Of course more regularity existed in the new than in the old line of thoroughfares, and the dwellings were more healthful and commodious; what was, in addition, wanted was certainly at hand, but an obtuse authority pooh-poohed as it would pooh-pooh to-day. Sir Christopher Wren's grand scheme [Illustn. i] was set aside; the foundations of an intricate plan were laid, complication upon complication ensued, and London is now the inconvenient network of thoroughfares, which the absence of any adequate controlling authority has permitted it to become.

I have thought that it would be interesting to have before us a copy of the plan which Wren had laid down for remodelling London. This plan, which was published in 1724, entitled "A Plan of the City of London after the Great Fire in the year of our Lord 1666 with the Modell of the New City according to the design and proposal of Sir Christopher Wren K^t. &c. for Rebuilding thereof," embraces an area of about 1,500 by 3,500 yards lineal, from the banks of the Thames to Clerkenwell (north and south), and from Lincoln's Inn Fields to the Tower (east and west), and is explained as follows:—"From the remaining part of Fleet Street which escaped the Fire about St. Dunstan's

“ Ch. a streight and wide Street crosses the Valley passing by the S. side of Ludgate, and thence in a direct line through y^e whole City terminates at Tower Hill ; but before it descends into the Valley where the great Sewer runs, it opens into a Round Piazza, the center of eight ways, where at one Station we see (I) straight forward quite through the City ; (II) Obliquely towards the Right Hand to the beginning of the key that runs from Bridewell Dock to the Tower ; (III) Obliquely on the Left to Smithfield ; (IV) streight on the Right to the Thames ; (V) streight to the Left to Hatten Street and Clarkenwell ; (VI) streight Backwards towards Temple Barr ; (VII) Obliquely on the Right to the Temple Garden ; (VIII) Obliquely on the Left to Cursitor’s Alley. Passing forward we cross the Valley, once sullied with an offensive Sewer, now beautified with a usefull Canal, with wharfs on each side passable by as many Bridges as streets that cross it. Leaving Ludgate, this great street presently divides into another as large, which carries our Eyes and Passage to y^e Front of the Exchange, and before these two streets spreading at acute angles can be clear of one another they form a Triangular Piazza, the Basis of which is filled by the Cathedral Church of St. Paul. But leaving St. Paul’s on the Left, we proceed as our first led us towards the Tower. We return again to Ludgate, and leaving St. Paul’s on the Right hand, pass along the other great Branch to the Royal Exchange ; seated in the Place where it was, but free from Building, in the middle of a Piazza included between Two great streets, One from Ludgate leading to the South Front, and another from Holborn over the Canal to Newgate, and thence streight to the North Front, &c. Instead of Ludgate Prison was designed a Triumphant Arch to the Founder of the New City, King Charles the Second.”

This plan, although exhibiting many portions which look better on paper than they would be found desirable in execution, shows the grand conception of its so highly talented author, it shows the grasp he had of what was essential for the dignified outlay of a city he has done so much to embellish, and the plan and description remain a monument of the shortsightedness of the authorities, who appear to have thought of little else than a rapid covering of an area so rapidly cleared, for we learn that within little more than four years the city was principally rebuilt.

In the reigns of Charles the Second and James the Second (1660-1685) many of the large houses of the nobility in the Strand were pulled down, and some further extension of the “ suburbs ” of the Metropolis took place, by the settlement of upwards of 13,000 French Protestants in Long Acre, Seven Dials, Soho and Spitalfields, their avocations being chiefly ornamental jewellery and silk weaving. During the reign of William and Mary (1689-1702) the Metropolis greatly expanded, particularly to the west : St. Giles’s and St. Martin’s-in-the-Fields becoming then incorporated with the Capital, which began then to approach the yet distant *village* of St. Marylebone. In the reign of Queen Anne (1702-1714) an important addition was made to the edifices of London by the erection of fifty new churches, and it is well to note that the cost of these churches was defrayed by a small duty on coals brought into the port of London. About the middle of the eighteenth century power was given to the Corporation to make such alterations in the avenues leading to the City as it might think necessary, and, although

beneficial alterations were made, nothing of adequate extent was accomplished, and it may be said, as a general remark, that, with few exceptions, no just appreciation of the urgency of alteration in the old, and strict supervision in the lines and widths of the new, thoroughfares, was shown until about the middle of the nineteenth century.

Before I proceed to consider London as it is to-day, I will pause to note that it was not until the reign of Queen Anne that party-walls were directed to be made either of brick or stone. In the reign of George the Second (1727-1760) a general lighting of London by parish assessment was adopted, and, soon after, a new mode of paving commenced, previously to which few of the streets had level footpaths for passengers, but were formed with small stones, and for the most part with a gutter down the middle. At this time, also, an Act of Parliament was passed for removing the enormous signs, &c., which hung across the streets.

LONDON AS IT IS IN 1885.

In using the word "London," I intend it to include, not only the City and its Liberties, but Westminster, Southwark, and the Metropolis generally, together forming the Capital of the British Empire.

London possesses, in a high degree, those natural advantages which are real blessings to its inhabitants. The soil, taken generally, is all that could be desired for healthy occupation, while it affords at the same time material, which no doubt accounts for the extensive employment of brick in its early edifices. The southern side of the grand river which, properly cared for, would supply good water, and constitutes the great medium of commerce, is uniformly flat, but the northern side is of gentle slope, and, with the buildings following the natural bend of the river, forms an imposing amphitheatre from east to west; offering facilities for architectural effect, which cannot be surpassed, if equalled, in any other city in the world.

The rapidity of the latter growth of London is startling; in the reign of George the Fourth (1825) it was computed to contain 160,000 houses, now it contains over 685,000, the increase during the year 1883 having been 20,214. The total length of streets sanctioned during the year 1884 was about 15 miles. In 1801 the population numbered 959,000; in 1821 it numbered 1,263,595; in 1871 it was 3,883,092; now it is over 4,000,000; and appears to increase at the rate of about 20 per cent. every 10 years, standing out, as regards extent, in bold contrast to Paris, which, according to the census of 1881, contained only 2,239,928 inhabitants, and 68,126 houses. The ratable value of property in London is now about £28,000,000, having increased nearly five-fold in the last forty-three years.

The government, therefore, of such a Capital as London, is of the first importance, and as it might be considered out of place here, to enter into any political discussion of its efficiency or non-efficiency, or whether it is, or is not, managed by too many authorities, and as the subject should not be in any way a Party one, I will content myself by noting the system or systems by which London is controlled.

THE GOVERNMENT OF LONDON IN 1885.

The Corporation.—The municipality of the City is elected from, and governs its district in the centre of London, at an expenditure of about £1,000,000 a year. The Corporation may be said to entirely control itself and its belongings; it has its own police force, it paves, lights, cleanses, waters and drains the streets, commands all sanitary matters, and has power to levy rates. It has very extensive estates, and many useful functions devolve upon its government, amongst which may be mentioned the markets, the library, the City of London school, besides law and city courts. Very large funds are available in the City, and these are expended in education, relief of the poor, and in many other public and private ways. It claims a monopoly of fish and meat markets, taxes grain and coal coming into London, and has a total ratable value of about £3,500,000. A walk in the City will show that, although there is, in many particulars, room for improvement, with the exception of the thoroughfares, the other visible matters coming under the control of the Corporation are in very fair condition. Besides the acquisition of Epping Forest, and other fine improvements carried out by the Corporation, there is that great and valuable work which eclipses, perhaps, as regards usefulness and completeness, any improvement yet carried out in London—I refer, of course, to the Holborn Viaduct—and those who remember the lamentable wear and tear of horse and man, in the days of Holborn Hill, cannot but place this work of the Corporation as first in the list of valuable scientific and practical undertakings in London.

The Metropolitan Board of Works.—This important body was called into existence by the Metropolis Local Management Act of 1855. It consists, including the chairman, of sixty members, elected by the various Vestries and District Boards of the Metropolis. It controls the main drainage, open spaces, bridges, fire brigades, artisans' dwellings, buildings, street improvements, offensive trades, and other matters outside the City, and some inside the City. The great and successful achievements of the Metropolitan Board are the Thames Embankment and the Main Drainage. The annual expenditure of the Board is from £2,000,000 to £3,000,000.

The Vestries.—These bodies were also constituted by the Act of 1855. There are twenty-three Vestries and fifteen District Boards, controlling the paving, lighting, cleansing, dusting, watering and minor drainage of the Metropolis. These bodies elect the Members of the Metropolitan Board, being themselves elected by the ratepayers; they carry out all the details of local administration, the inspection of all unhealthy premises, the analysis of all food sold, and have the control of everything affecting the health of the district. They possess also power in the establishment of baths, wash-houses, libraries, mortuaries, and other matters. The Vestries have rating power, their expenditure is about £2,000,000 per annum, and, taken generally, it will probably be conceded that the work of the Vestries is fairly carried out.

Boards of Guardians.—Other principal bodies acting for the welfare of this vast Metropolis are the Boards of Guardians, of which there are thirty, controlling the workhouses, dispensaries, medical out-door relief, and the relief of the poor generally. The poor rate levied in London exceeds £2,000,000 per annum.

Metropolitan Asylums Board.—The Metropolitan Asylums Board controls the erection and maintenance of asylums and hospitals for the imbecile poor, and those afflicted with contagious disease. There are twelve such institutions, with accommodation for about 7,000 patients.

School Board for London.—The School Board, which consists of forty-nine members, is a direct representative body, elected by the ratepayers of the ten School Board Divisions, and controls the educational requirements of the Metropolis.

Police.—The maintenance of public order and security, the inspection of cabs and omnibuses, the issue of licenses to drivers and conductors, the inspection and registering of common lodging houses, and other duties, come under the control of the Metropolitan Police, of which, exclusive of the City of London Police, there is a total force of all ranks of about 11,000 men.

Thames Conservancy Board.—The Thames Conservancy Board controls the waterway of the great Metropolitan River, and provides for the scavenging of its surface from impure matter.

Lea Conservancy Board.—The Lea Conservancy Board exercises similar control with respect to the River Lea.

Lighting.—Lastly, London is artificially illuminated principally by gas. Electric Lighting is making way, but apparently not sufficiently to disturb the equanimity of the four companies who divide among them the supply to the Metropolis. The testing of the quality of the gas supplied is in the power of the Metropolitan Board.

ACTS OF PARLIAMENT GOVERNING LONDON.

It is a very interesting study to note all that the State has done to preserve the health of the dweller in London. I will proceed to give extracts from certain Acts of Parliament, which will show the enormous pains the legislature of this country has taken, from time to time, to meet the necessities of the cases as they arose, and to keep pace with the advanced opinions and knowledge of sanitarians. When these Acts have been perused, it is impossible to avoid the conclusion that, assuming adequate means to enforce their wise provisions, the poorer classes of London have been thought of, and cared for, with a keenness worthy of every praise. This being so, and the wealthier classes having, in combination with the Acts of Parliament, the wherewithal to keep their houses healthy, it will be well to consider if substantial grounds exist for the present out-cry for more legislation, and wherein amendment is required.

Some very interesting articles have recently appeared in *The Times* on the subject of local government in England, and from them we learn that the earliest sanitary law to make its appearance upon our statute book was passed in the reign of Richard II. (1377-1399). It was an act for "punishing nuisances which cause corruption of the air near cities and towns," and, by reason of its quaint and expressive language, may well be quoted in full:—

"Also for that so much dung and other filth of the garbage and entrails, as well of "beasts killed as of other corruptions, be cast and put in ditches, rivers, and other

“waters, and also many other places within, about, and nigh unto divers cities, boroughs, and towns of the realm, and the suburbs of them, that the air there is greatly corrupt and infect, and many maladies and other intolerable diseases do daily happen as well to the inhabitants and those that are conversant in the said cities, boroughs, towns, and suburbs, as to others repairing and travelling thither, to the great annoyance, damage, and peril of the inhabitants, dwellers, repairers, and travellers aforesaid. It is recorded and assented that proclamation be made as well in the city of London as in other cities, boroughs, and towns throughout the realm, where it shall be needful as well within franchises as without, that all they which have cast and laid such annoyances, dung, garbages, entrails, and other ordure in ditches, rivers, waters, and other places aforesaid shall cause them utterly to be removed, avoided, and carried away betwixt this and the feast of Saint Michael next ensuing, after the end of the present Parliament, every one upon pain to lose and to forfeit to our lord the King twenty pounds, and that the Mayors and bailifs of every such city, borough, and town, and also the bailifs of franchises shall compel the same to be done upon like pain. And if any feel himself grieved that this is not perfected in manner aforesaid, and will thereupon complain to the Chancellor after the said Feast of Saint Michael, he shall have a writ to cause him of whom he will so complain to come into the Chancery there to show why the said penalty should not be levied of him, and if he cannot duly excuse himself, the said penalty shall be levied of him. And, moreover, proclamation shall be made as well in the said City of London as in other cities, boroughs, and towns as aforesaid, that none of what condition soever they be, cause to be cast or thrown from henceforth any such annoyance, garbage, dung, entrails, or any other ordure into the ditches, rivers, waters, and other places aforesaid, and if any so do, he shall be called by writ before the Chancellor at his suit that will complain, and if he be found guilty he shall be punished according to the discretion of the Chancellor.”

It is to be regretted that we have no record of the working of that Act, but, from its date, I think we may surmise that its execution was commensurate with its language.

The Metropolis Local Management Act, 1855.—An Act administered by the Vestries, the District Boards, and the Metropolitan Board of Works, the following being a selection of its leading clauses, so far as they affect the subject of this paper:—

As regards the sewers, the Vestries and District Boards are empowered to perform all works which they may consider necessary to the old sewers, and, with the approval of the Metropolitan Board, they may, when they think it desirable, construct new sewers.

They (the Vestries and District Boards) are to provide proper traps or ventilation to prevent effluvia of sewers from exhaling through gully holes, gratings, &c., in any of the streets.

They are to construct the sewers so as not to be a nuisance or injurious to health, and to properly clear, cleanse and empty them.

They have power to secure that every house has its drain properly connected with a sewer, if one exists within a distance of 100 feet therefrom.

They have power to prevent the occupation of any house built after the passing of the Act, unless the drains, apparatus, and water supply are constructed to their satisfaction.

They have power to control the whole system of drainage and water supply of every house from its commencement to its finish.

They have power to control the branching into main sewers.

They have power to perform the branching, &c., themselves, and charge the owner of the house with the cost of the work.

They have power to provide sufficient and proper water-closets, privies, ash-pits water supply, apparatus, &c., at the expense of the owner of the house, if they think fit, or they can call upon him to do so.

They have power to enter houses and open ground to inspect drains, water-closets, privies, cesspools, water supply, apparatus, sinks, traps, syphons, pipes, or other works or apparatus connected therewith.

They have power to inflict a penalty for non-compliance with their directions, and to do the necessary works themselves and charge the offender with the costs.

They have power to provide and maintain urinals, water-closets, and like conveniences.

They have power to pave, as they may think proper, all streets, &c.

They have power to put up posts or other erections in any carriage-ways so as to make the crossings less dangerous for foot passengers.

They have power over the breaking up of pavements, roads, &c., by any company for works to pipes, and during the months of December, January, and February, they can prevent the roads, &c., being taken up for laying down any water main.

They control the lighting, to prevent accidents while paving works, &c., are in progress.

They have power to water the streets as they think fit, and to fix pumps for the gratuitous supply of water to the inhabitants.

They have power to cause to be scraped, swept, and cleansed, all footways.

They have power to appoint and pay crossing sweepers.

They have power over projections from houses, and obstructions in the streets.

They have power over all hoards and enclosures.

They have power to cleanse all streets from dirt, rubbish, and snow, and also to cleanse and empty privies, cesspools, sewers, and drains.

They have power to light the streets.

They have power to appoint medical officers of health to ascertain and report upon the existence of diseases, and to point out the most efficacious modes of checking and preventing the spread of such diseases, as also to point out the most efficient modes for the ventilation of churches, chapels, schools, lodging-houses, &c.

They have power to appoint inspectors of nuisances to inspect and report upon the existence of any nuisances.

It may sometimes strike one as peculiar that the roadways and footways of London should be of so many varieties; that after enjoying a drive on metalling which seemed to meet all reasonable requirements, we should be suddenly jolted on to a roadway which met none of them; that whereas one length of roadway is covered with asphalte, its neighbour is paved with macadam or flint; that the products of far removed northern climates, in the shape of wood pavement, hustle the hard productions of our nearer Northern Aberdeen, or hard, but blushing, Mount Sorrel. Equally it is matter for remark that, whereas one roadway carries us along on its broad even back as smoothly as does the iron way, another seems intent on showing how solicitous it is to store water in little pools, providing, at the same time, for an active industry in the repair of rolling stock. So, too, the footways: hard tooled York, asphalte, gravel, and Victoria and other patent stones, all receive the foot of the pedestrian in a walk of a mile, and similar divergence of opinion as to what constitutes proper repair, appears to worry the worried mind of the Vestry surveyor in the matter of footways, as it does of roadways. What subject is there then for surprise if one vestry considers duty to its constituents fulfilled by clearing away snow from the streets within a few hours of its fall, whilst another sets its mind at rest when it has cleared it away in a few days, and then only because the temperature has not been kind enough to anticipate its action by that thaw so dear to the heart of the contractor, whose contract was so carefully and stringently worded as to clearance of snow immediately after its fall. Then one practical body of men considers that the metalling of roadways is injured by a too copious supply of water, even during the hot, dusty days of July and August, whilst another allows the water to be thrown on in such a manner, that the roads are almost impassable on account of the thereby created mud.

As for household dust, it sometimes happens that its removal can be secured by the mere exhibition of the capital letter D, or by a verbal communication to the dustman—sometimes it cannot be secured without the exhibition of the monetarily small, yet capital D, or without a sharp note to the sanitary officer of the district.

Of all the Acts governing London which I have perused in connection with this subject, I know of none which, for clearness of diction and of intention, equals this Metropolis Local Management Act of 1855. But, very curiously, in consequence of recent correspondence and articles in *The Times* on a so-called "London Rookery," Nos. 35 and 37, Lisson Street, it would appear that this Act of Parliament is not so clear as it would otherwise seem. I think, however, that anyone reading the clauses which I have particularly quoted (and I may add that there is not any qualification of them in the other part of the Act), would have considered that the course and power of the vestry (in this case, St. Marylebone) was distinct and absolute. But no! Dr. Wynter Blyth, the medical officer of health, Mr. W. E. Greenwell, the vestry clerk, and the Sanitary Committee of St. Marylebone Vestry agree in stating that "it is well known" among those who have to administer the Sanitary Acts, that it is impossible to enforce "a water supply to any closet unless a complaint of nuisance is established," and certainly Mr. Greenwell and Dr. Blyth are no mean authorities on such a subject.

Now, one of the grounds of complaint, proved and admitted by the Vestry in the case above referred to was, that 34 persons in one house had only one privy, which was without water and had to be unstopped from time to time by those of the tenants who would undertake the inviting occupation. This, although seen by the doctor and by the sanitary inspector and mentioned in *The Times*, was not, they say, complained of as a nuisance; they themselves acquiesced apparently in this view of the matter, and so they did not take the steps which the Act empowers them to take. Then the case came before the Metropolitan Board. The Board would not enter upon that part of the enquiry as to the "alleged" (mark the caution of the Board) insanitary condition of the premises in question, "because the Vestry of St. Marylebone was the Sanitary Authority for the "district." Now, I at once take leave to challenge the correctness of view of the Vestry and of the Board. The Act in no way whatever demands "complaint of nuisance," but, on the contrary, leaves initiatory proceedings entirely to the Vestries; and the Metropolitan Board had full power to question the action of the Vestry, as it is the supreme controlling authority. If, therefore, this is a sample of how Acts, carefully framed for the benefit of London, are executed, who can wonder at the outcry against the present system of London government?

The Diseases Prevention Act, 1855.—An Act empowering the General Board of Health, whenever any part of England appears to be threatened with or is affected by any formidable epidemic or contagious disease, to issue directions and regulations for the speedy interment of the dead, for house to house visitation, for the dispensing of medicines, for guarding against the spread of disease, and for affording to persons afflicted by or threatened with such epidemic, endemic, or contagious diseases, such medical aid and such accommodation as may be required. The local authority is to see to the execution of these regulations. The provisions of any general Act in force for the removal of nuisances with regard to notices, recovery of penalties, &c., are to apply to this Act.

The Nuisances Removal Act for England, 1855.—An Act giving the local authority power of entry to ground proceedings, to examine premises where nuisances exist, to ascertain the course of drains, and to execute or inspect works ordered by justices to be done under this Act; also to examine and destroy any food unfit for human consumption, to proceed in cases of nuisances arising in cases of noxious trades, businesses, processes, or manufactures, to take proceedings in case of overcrowding in houses, and generally to take all necessary steps to prevent nuisances, and to ensure, as far as possible, the health of the inhabitants.

The Metropolis Management and Building Acts (Amendment) Act, 1878.—This chiefly provides for regulating the widths of roadways and passage-ways, the erection and extension of houses and buildings in proximity to roads, passages, &c., for the protection of the public frequenting theatres and music halls, from danger from fire, and for regulating the making, filling up, and preparation of the foundations and sites of buildings, and the quality of the substances to be used in the formation or construction of the sites, foundations, and walls of such buildings, with a view to their stability, the prevention of fires, and for purposes of health.

The Metropolis Management and Building Acts (Amendment) Act, 1882.—Empowers the Metropolitan Board to name and number streets in default of Vestries, &c., complying with the orders of the Board; it also empowers the Board to remove, in case any unauthorised person does not remove when he is called upon to do so, any post, rail, bar, fence, or other obstruction or encroachment in, upon, over, or under any street, when such impedes or hinders the traffic; it gives the Board power to prevent “culs-de-sac,” and power over the formation of all streets proposed for foot traffic only; it gives power to the Board to determine the amount of open space to be dedicated to the use of the public in front of any building which, by the consent of the Board, has been erected beyond the general line of buildings in the same street; it gives power to the Board to regulate the erection and removal of iron or other buildings of a temporary character; it regulates the open spaces which are to be left at the rear of all new buildings intended to be used wholly or in part as dwelling-houses, when such are to be erected upon a site not previously occupied in whole or in part by a building, and specifies the respective areas of open space required; it provides for the conversion of non-public into public buildings in manner to be approved by the Board; it relieves pipes for conveying hot water or steam at low pressure from the obligations and restrictions imposed by the 21st section of the Metropolitan Building Act, 1855, as regards the distance from combustible materials; it gives power to the Board to compel the repair or taking down and rebuilding of any building which a justice of the peace may consider should be so treated, and, failing compliance with the order, the Board may itself execute the order, &c.

The Public Health Act, 1875.—An Act practically regulating sanitary matters and public improvements outside the Metropolis, its execution being confided to the charge of certain urban and rural authorities under the supreme authority of the Local Government Board.

The Artizans' and Labourers' Dwellings Act, 1868.—This provides for taking down or improving dwellings occupied by working men and their families which are dangerous to health and unfit for human habitation, and for the building and maintenance of better dwellings for such persons instead thereof. The provisions of this Act extend to the City of London and the Liberties thereof, the Metropolis, and to Scotland and Ireland. It empowers the officers of health to inspect any premises which are in a condition or state dangerous to health, so as to be unfit for human habitation, and report to the local authorities, and the clerk of the local authority can then, if he deems it necessary, cause to be prepared a plan and specification of the works to be done, and an estimate of the cost. The works may consist of alterations and improvements, or partial or entire demolition, and not only are the officers of health empowered to initiate the complaint, but any four or more householders living in or near to the street in which the premises complained of are situate, may, by writing under their hands, represent the fact to the officer of health. Persons aggrieved by the orders of the local authority may appeal against the same to the Court of Quarter Sessions; but unless they perform the required works within the times and in the manner directed, the local authority has the power to perform the works themselves and recover the costs as is provided for in the Act.

The Artizans' and Labourers' Dwellings Improvement Act, 1875.—This Act provides for pulling down and reconstructing houses, courts and alleys which, by reason of the want of light, air, ventilation, or of proper conveniences, or from other causes, are unfit for human habitation, generating fevers and diseases, and causing death and loss of health not only in the courts and alleys, but also in other parts of the cities and boroughs. As regards the City of London, the authority for carrying this Act into execution is the Commissioners of Sewers, and as regards the Metropolis, the Metropolitan Board of Works. The Act contemplates and authorizes improvement schemes for the re-arrangement and reconstruction of the streets and houses within the district complained of by the medical officer of health, or by twelve or more persons, being ratepayers. For this purpose the local authority may include any neighbouring lands which it may consider necessary for the efficiency of the scheme for sanitary purposes, and it may provide for widening any existing approaches to the unhealthy area complained of, and for opening out the same for the purposes of ventilation or health. It is to provide for the accommodation of, at the least, as many persons of the working class as may be displaced in the area with respect to which the scheme is proposed, in suitable dwellings within the limits of the same area, or in the vicinity thereof, and the scheme, when properly formulated, is to be submitted to a Secretary of State when the local authorities are the Commissioners of Sewers or Metropolitan Board of Works, and to the Local Government Board when the authority is an urban sanitary authority, for an order confirming the scheme, after which confirmation the scheme may proceed as directed by the Act. Further, the local authority may take down and clear away the buildings upon the area complained of, and may lay out, form, pave, sewer and complete all such streets upon the land purchased by them as they may think fit, but without the express approval of the confirming authority, they may not themselves undertake the rebuilding of the houses or the execution of any part of the scheme. In any cases the local authority may grant, due provision is to be made for the maintenance of proper sanitary arrangements. If within five years after the removal of any buildings on the land set aside as sites for working men's dwellings the local authority have failed to sell or let such land for the purposes prescribed by the scheme, or have failed to make arrangements for the erection of the said dwellings, the confirming authority may order the said land to be sold by public auction or public tender, with full power to fix a reserved price subject to the conditions imposed by the scheme, and to such other reservations and regulations as the confirming authority may deem necessary. Power is given to the confirming authority to permit the local authority to modify any part of an improvement scheme authorized by the confirming Act, subject in certain cases to confirmation by Parliament. Provision is also made for financing the schemes, the appointment of arbitrator, the order of appeal, and other miscellaneous matter.

The Artizans' and Labourers' Dwellings Act (1868) Amendment Act, 1879.—This extends the powers of the Artizans' Dwellings Act of 1868 just referred to by provisions for compensation and rebuilding. By this Act the owner of any premises which, under the Act of 1868, have been ordered to be repaired or demolished, may, within three months

after service on him of the order, require the local authority to purchase such premises, arbitration being provided for in special terms, in case of dispute as to the amount to be paid to the owner by the local authority.² If any property acquired by the local authority under this Act is not within seven years after the acquisition thereof disposed of, the property so acquired may be sold by order of one of Her Majesty's Principal Secretaries of State by public auction or public tender, with full power to fix a reserve price. Power is given to the local authority to make by-laws for the regulation of dwelling houses belonging to them under this Act, and other provisions are made, generally, on the lines of the Act of 1868.

The Artizans' and Labourers' Dwellings Improvement Act, 1879.—This directs the arbitrator appointed under the powers of the previous Acts, to determine what would have been the value of the premises ordered to be dealt with under these powers, if the premises had been in such a condition as to have been a nuisance, within the meaning of the Act relating to nuisances, at the date of the confirming order, the object being to deduct from the amount, which would have been otherwise payable to the owner, the estimated cost of the works required to abate the nuisance. This Act authorizes a modification of any scheme to be carried out under the previous Acts, so far as regards providing accommodation for persons of the working class, which may now be provided in some place other than within the area, or the immediate vicinity of the area, comprised within the improvement scheme. It also empowers the arbitrator to determine that a *part* of any premises, proposed to be taken by the local authority, can be so taken without material damage to such premises, and to award compensation in respect of the severance of the part proposed to be taken, in addition to the value of that part, without the local authority being obliged to purchase the greater part or the whole of such premises. Power of appeal is given.

The Artizans' Dwellings Act, 1882.—This makes further provision with reference to the accommodation to be provided for the displaced working classes, and authorises the confirming authority to dispense altogether with the obligation of the local authority to provide for the accommodation of the persons of the working class, who may be displaced by their scheme, to such extent as he may think expedient having regard to special circumstances, but not exceeding one half of the persons so displaced. It also provides for the exclusion (unless necessary for the maintenance of the property in a proper state of repair) of compensation for improvements made to property after the date of the advertisement provided for in section vi of the Act of 1875. It also limits the proceedings of the Metropolitan Board of Works, under the Act of 1875, to areas containing more than ten houses. In cases where there are not more than ten houses the local authority, as defined by the Act of 1868, is to deal with them. If any building to which the Act of 1868 applies is, in the opinion of the officer of Health, although not in itself unfit for human habitation, so situate that, by reason of its proximity to or contact with any other buildings, it stops ventilation, or causes such other building to be in a condition unfit for human habitation, or prevents other improvements, this Act empowers the

² See amendment to this Act in "The Housing of the Working Classes Act," p. 30 hereinafter.

local authority to pull down the "obstructive building," and acquire by purchase its site. Where, in the opinion of the arbitrator, the demolition of an obstructive building adds to the value of adjoining buildings, the cost of demolishing the obstructive building is to be under this Act apportioned on such adjoining buildings, and recovered from the occupiers by levy of improvement rates. When a local authority fails to put in force the provisions of the Act of 1868, after the report of the officer of Health that such is necessary, the Metropolitan Board of Works is empowered under this Act to proceed as though it were the local authority in the same manner as the latter may under section xii of the Act of 1879. This Act also amends the arbitration proceedings as set forth in the Act of 1875.

The Metropolitan Street Improvements Act, 1877.—This authorises the Metropolitan Board of Works to make the new streets and street improvements mentioned in the Act, and shown on the deposited plans, which it will not be necessary here to detail, except to note that the "Gray's Inn Road Improvement" is mentioned, for I have commented thereon in this paper. Power is given to the Metropolitan Board of Works in this Act, to take, use, hold and acquire easements over such lands as they may deem necessary for the purposes of the improvements and for providing space for the erection of houses and buildings adjoining; also to alter the lines or levels of any of the streets to be dealt with, and to make diversions, widenings, or alterations of lines or levels of any existing streets for the purpose of connecting the same with the works, or of crossing under or over the same or otherwise. The Board is also empowered to lay out the carriage-ways and foot-ways, and to construct, erect, and provide such vaults, cellars, arches, sewers, drains, sub-ways, and other works and conveniences, as they think proper, for the purposes of the improvements. The Board is made liable to make good any deficiency in the land tax which may have arisen by reason of the exercise of the powers granted by this Act, and is empowered to lease the surplus lands, and to sell the ground rents reserved by such leases, reserving covenants for approval of the houses to be erected. The Board "shall" within ten years after the completion of the improvements sell and dispose of such parts of the lands acquired as may not be wanted for the purposes of the improvements, and sell or let for the erection of dwellings for the displaced working classes such portions of the lands as are coloured blue on the deposited plans, and may purchase such further lands as may be necessary for the purpose. But if within three years after the acquisition or appropriation of the lands acquired for the purposes, the Board shall have failed to sell or let such lands for the erection of the dwellings referred to, one of Her Majesty's Principal Secretaries of State shall order the said lands to be sold or let by public auction or private tender, with full power to fix a reserve price, and on condition that the purchaser erects dwellings for the labouring classes.

The Metropolitan Street Improvements Act (1877) Amendment Act, 1882.—This Act refers entirely to the manner of carrying out the Gray's Inn Road Improvement, and particularly as regards the erection of artizans' dwellings.

The Metropolitan Building Act, 1855, and the subsequent Acts.—These relate more

particularly to the constructive details of buildings, the object of the original Act being to prevent as far as possible the spread of fire. The responsibility connected with the carrying out of the provisions of these Acts rests principally with the district surveyors, who are elected by, and are under the control of, the Metropolitan Board of Works. Provision is also made in these Acts for dealing with dangerous structures. For the purposes of the Building Acts, the Capital is divided into 70 districts, each superintended by a district surveyor, whose duty it is to see that all erections and all additions to buildings are carried out in accordance with the law.

The Public Improvements Act, 1860.—This Act enables a majority of two-thirds of the ratepayers of any parish or district duly assembled to rate their district in aid of public improvements for general benefit within their district. It enables the purchase or lease of lands and the acceptance of gifts and grants of land for the purpose of forming any public walk, exercise or play-ground, and the levy of rates for maintaining the same, and for the removal of any nuisances or obstruction to the free use and enjoyment thereof, and for improving any open walk or footpath, or placing convenient seats or shelters from rain, and for other purposes of a similar nature. Provided always that previous to any such rate being imposed a sum in amount not less than at least one-half of the estimated cost of such proposed improvement shall have been raised, given, or collected by private subscription or donation, and such rate is not to exceed sixpence in the pound.

The Metropolitan Fire Brigade Act, 1865.—An Act which provides for a Fire Brigade under the control of the Metropolitan Board of Works.

The Lands Clauses Consolidation Act, 1845.—An Act which provides for the acquisition of lands required for undertakings or works of a public nature, and for the compensation to be made for the same. This Act applies to all undertakings authorized by Acts hereafter to be passed.

The Lands Clauses Consolidation Acts Amendment Act, 1860.—This provides for the amendment of the Act of 1845 in regard to sales and compensation for land by way of a rent-charge, annual feu duty, or ground annual, and for the enabling of Her Majesty's Principal Secretary of State for the War Department to avail himself of the powers and provisions in that Act, for the purchase of lands required for the service of the Admiralty or of the War Department, or for the defence of the realm.

The Lands Clauses Consolidation Act, 1869.—This provides for the settlement of costs of arbitration, and allows the High Bailiff of the City and Liberty of Westminster to take the place of the Sheriff provided for in the Act of 1845, in all cases of disputed compensation, where the lands are situate in the City and Liberty of Westminster.

The Lands Clauses Umpire Act, 1883.—This empowers the Board of Trade to appoint an umpire when the arbitrators refuse or neglect for seven days after the request of either party to the arbitration to appoint an umpire.

The Public Works Loans Act, 1875.—This provides for making loans for the purposes mentioned in the Schedule to the Act, among them being the following, which are more intimately connected with the subject of this Paper:—Baths and Washhouses; Improve-

ments of Towns ; Labourers' Dwellings ; Public Libraries and Museums ; and any work for which a sanitary authority may borrow under the Public Health Act, 1875.

The Public Works Loans (Money) Act, 1876.—This Act provides for special loans, and removes doubts as to powers to advance money for the special cases mentioned.

The following Acts relate principally to the Crown property in Regent's Park, Regent's Street, &c. :—

The Act 53rd of George the Third, cap. 62, is a carefully detailed Act for paving, cleansing, watering, lighting, watching, and otherwise improving certain streets, and other public passages and places in the parishes of St. Marylebone and St. Pancras, then called Marylebone Park, and now known as Regent's Park, and generally for the removal of dust from the houses, prevention of encroachments and nuisances in the districts mentioned. Powers are given under the Act to borrow money, and to levy rates.

The Act 53rd of George the Third, cap. 121, provides for the making a more convenient communication from Marylebone Park and the northern parts of the Metropolis, in the parish of St. Marylebone, to Charing Cross, and for making a more convenient sewage for the same.

The Act 56th of George the Third, cap. 128, amends the previous Acts, and provides further detailed regulations for the places referred to. This Act is extended by the *7th and 8th of George the Fourth, cap. 66*, and enables His Majesty to grant small portions of land as sites for public buildings, or to be used as cemeteries.

The Act 5th of George the Fourth, cap. 100, provides for more effectually paving, lighting, watching, cleansing, and regulating the Regent's Park, together with the new street from the Regent's Park to Pall Mall, and the new streets and improvements in the neighbourhood of Parliament Street, and Privy Gardens, and for maintaining a convenient sewage for the same.

The Act 6th of George the Fourth, cap. 38, extends the jurisdiction of the Commissioners appointed under the last-mentioned Act.

The Act 7th of George the Fourth, cap. 77, further extends the 5th of George the Fourth, and enables the Commissioners of His Majesty's Woods, Forests, and Land Revenues to grant leases of the site of Carlton Palace.

The Act 18th of George the Fourth, cap. 61, amends this foregoing Act.

The Act 9th of George the Fourth, cap. 64 and 70, further extends the jurisdiction of the Commissioners acting under the previous Acts, and enlarges the powers of and amends those Acts.

The Act 1st and 2nd of William the Fourth, cap. 29, authorizes the formation of a new street, from the Strand to Charles Street, Covent Garden, and to widen the north end of Bow Street into Long Acre.

The Act 2nd of William the Fourth, cap. 56, extends the provisions of previous acts to certain other streets and places in Westminster.

The Act 11th and 12th of Victoria, cap. 50 (1848) empowers the Commissioners of Her Majesty's Woods to remove the Colonnade in the Regent's Quadrant.

The Act 14th and 15th of Victoria, cap. 42, makes better provisions for the management of the woods, forests, and land revenues of the Crown, and for the direction of public works and buildings.

The Act 14th and 15th of Victoria, cap. 95, transfers to the parishes the duties defined by previous Acts for paving, lighting, watering and cleansing certain places in the Regent's Park and Westminster.

The Act 57th of George the Third, cap. 29, provides for the better paving, improving and regulating the streets of the Metropolis, and removing and preventing nuisances and obstructions therein.

The Parks Regulation Act, 1872, provides for the protection from injury of the Royal parks, gardens and possessions, under the management of the Commissioners of Her Majesty's Works and Public Buildings, and for the security of the public from molestation and annoyance while enjoying such parks, gardens and possessions.

The Metropolitan Open Spaces Acts, 1877 and 1881, provide facilities for making available the open spaces in the Metropolis for the use of the inhabitants thereof for exercise and recreation.

The Public Libraries Act, 1855.—An Act for further promoting the establishment of free public libraries and museums in municipal towns, and for extending the same to towns governed under Local Improvement Acts, and to parishes. It empowers the appropriation of lands vested, as the case may be, in the borough, in the Mayor, Aldermen and Burgesses, and in a district in the Board, and the purchase or rent of any lands or suitable buildings for public libraries or museums, or both, or for schools for science or art, and also empowers the erection of new buildings, and the alteration, extension, repair, fitting up and furnishing of the same respectively. The Act also details the system of acquisition and management to be adopted under it. The expenses incurred in taking advantage of the provisions of the Act are to be recovered by a rate which is not to exceed one penny in the pound in any one year.

The Public Libraries Amendment Act (England and Scotland), (1866) and the Public Libraries Act (1855) Amendment Act, 1871.—This makes certain alterations in the details of the Act of 1855 not materially affecting its general principle.

The Public Libraries Amendment Act, 1877.—This alters the mode of ascertaining the opinion of the majority of ratepayers as to taking advantage of the provisions of the Act—as it had been found that in many cases the public meeting prescribed by the principal Act was a most incorrect and unsatisfactory mode, and failed to indicate the general opinion of the ratepayers. The new mode sanctions the above prescribed public meeting and also the issue of a voting paper to each ratepayer, and the subsequent collection and scrutiny thereof, and such voting paper, in addition to the simple vote "yes" or "no," may stipulate that its adoption shall be subject to a limitation to some lower rate of assessment than the maximum allowed by Act of Parliament in force at the time.

The Housing of the Working Classes Act, 1885.—This is to amend the law with reference to the provisions of suitable dwellings for the working classes. The provisions of this

Act wisely extend to *all* districts and sanitary authorities, subject to certain revisions, in England, Ireland and Scotland. The object of the Act is to enable the erection of additional accommodation for the housing of the working classes, and it empowers the various authorities to proceed to provide it in the manner prescribed. It also empowers, in the event of removal from their present sites of Millbank Penitentiary, Pentonville Penitentiary, Coldbath Fields Prison, or House of Detention, Clerkenwell, the sale and conveyance of those respective sites or any part or parts thereof to the Metropolitan Board of Works at a fair market price. The Artizans' and Labourers' Dwelling Act, 1868, is amended by this Act in an important particular, in that it takes away the power of the owner of any premises who is required under the Act of 1868 to execute any works or to demolish any premises, to require the local authority to purchase such premises. The Artizans' and Labourers Dwellings Improvement Acts, 1875 to 1882, are by this Act extended in certain particulars to all urban sanitary districts, and the Act empowers a Secretary of State to appoint an arbitrator to hold enquiry and report, &c. The rate of interest on Public Works Loans advanced by the Public Works Loans Commissioners is amended under this Act to not less than $3\frac{1}{2}$ per cent. up to December 31st, 1888. This Act also amends the general sanitary law in the direction of securing the prompt enforcement thereof, and conferring more power in its execution, particularly with regard to tents, vans, sheds, or similar structures used for human habitation. In amending the Settled Land Act of 1882 a very important provision is made with regard to the sale, exchange, or lease of land, when made for the purpose of the erection on such land of dwellings for the working classes. It may now be made at such price, or for such consideration, or for such rent, as having regard to the said purpose, and to all the circumstances of the case, is the best that can be reasonably obtained, notwithstanding that a higher price, consideration or rent, might have been obtained if the land were sold, exchanged or leased for another purpose. Power to sell under similar conditions is extended also to any body corporate holding land.

The Public Health (Metropolis) Bill (1885), which was a House of Lords Bill, and did not pass, was intended to consolidate with amendments certain Acts relating to nuisances, infectious diseases, and other matters concerning public health in the Metropolis. It was presented by the Marquess of Salisbury, and was intended to complete the work left undone by the Public Health Act of 1875, which, as regards England exclusive of the Metropolis, consolidated with amendments certain repealed Acts, but as regards the Metropolis left them standing to be dealt with on a future occasion. This consolidation of existing Acts, and making them, where they can be applied, applicable to all England, Ireland and Scotland, was a step in the right direction, and it is to be regretted that the Bill did not pass into law.

INADEQUACY OF MACHINERY FOR EXECUTING ACTS OF PARLIAMENT.

We must now consider for a moment why the Results have fallen so short of the Powers. One reason is the undoubted apathy which characterises three-fourths of the rate-

paying population of London. They allow men to fill offices involving control over the expenditure of many thousands of pounds a year (towards which they have to contribute), whom they would not trust further than they could see them in any ordinary commercial transaction, and they will not take even the trouble to record their vote for the election of their own vestrymen. They would not themselves care to associate with some of the men elected, and leaving the election to those perhaps who, in more ways than one, are deeply interested in the result, they indirectly further gross administration, and lower the standard of what should be a body of respectable, responsible and intelligent men, having in their hands the care of the ratepayers' money, as well as the health and comfort of the inhabitants.

As regards the Vestries and District Boards, I venture to assert that many of the Acts relating to the Sanitary Government of London are utterly unknown to those appointed under them to see them carried into effect. Those who have had the administration of Acts of Parliament know how hardly they sometimes weigh on the person least able to bear them, and how by legal quibble and grasp of loop-hole, the person intended to suffer, by reason of his culpable neglect, escapes scot free, and how strong the inclination sometimes is to continue a mild enforcement of the law, when strict compliance would lead to the collapse of a poor and innocent lessee, upon whom a rich lessor has perhaps artfully contrived to shift his responsibility.

It cannot be doubted that due enforcement of existing Acts with the sufficient provision of officers for the purpose of house-to-house visitation, would lead, at first, to an increase in the rates and in house rent; but this should certainly not deter due administration, because in a few years the older portions of the Metropolis would become gradually renovated; and the newer portions should, at the start, be so constructed that future trouble would be almost entirely removed.

To prove how impossible it is that adequate supervision can be maintained with existing machinery, it is only necessary to quote the following two cases.

In the parish of St. Marylebone there are about 16,000 houses and 155,000 inhabitants, and the enforcement of the various Acts of Parliament relating to the sanitary maintenance of that parish is supposed to be provided for by the appointment of one medical officer and analyst, and three sanitary inspectors, assisted at times by the parish beadles.

In the parish of St. Pancras there are about 24,700 houses and 236,000 inhabitants, whose interests, under sanitary Acts, are supposed to be secured by two medical officers and analysts, and three sanitary inspectors.

Three sanitary inspectors to survey and keep healthy 24,700 houses!

What education or special training have the sanitary inspectors received to qualify them for the duties they are called upon to fulfil? A short time ago a vacancy occurred in St. Pancras for a sanitary inspector, and the applicants for the post, instead of being educated for such special work, were men who appeared to conclude that the duties of a sanitary inspector consisted principally in the survey of dust-holes within, and the removal of dead cats without, the house. If it is desired that these men shall

duly administer the Acts which created them, they should be specially trained for the purpose, should pass an examination in a similar manner to that entitling men to act as district surveyors, and should be in receipt of far higher salaries than they now obtain.

THE METROPOLITAN BOARD OF WORKS AND ITS STREET IMPROVEMENTS.

In the opening Address of this Session, delivered a fortnight ago by Mr. Edward T'Anson, as President of the Surveyors' Institution, he referred in a general commendatory spirit to the expenditure made, and the works executed, by the Metropolitan Board of Works; and that general commendatory spirit I endorse with much pleasure. But, when I leave that general commendation, and turn to those details upon which depends the complete success or failure of the undertakings, I regret to say that condemnation takes the place of commendation.

The Metropolitan Board of Works, created, as I have said, by the Act of 1855, was invested with great powers, and great expectations were formed of the effect of constituting in this Metropolis a complete local administration, the elect, practically, of the London ratepayers. We will now consider how one very important branch of the Board's works, viz., its *Street Improvements*, has been carried out, and whether, taken altogether, the great expectations formed have been fairly realized. It is clearly no part of my province to enquire whether or not the staff of the Board is sufficient; all its officers are, I believe, animated by a desire to do what is right, but somehow or other they appear to succeed most in doing that which, to my mind at least, is wrong.

Northumberland Avenue.—Northumberland Avenue by reason of its limited length, and other circumstances, was, as regards line and level, one of the easiest of engineering feats. It was of course not possible, having determined on the direction the street was to take, to avoid opening up the unsightly South Eastern Railway Station (a station, by the way, so unmitigatingly ugly outside that it should never have been allowed to be erected), but it was certainly much to be desired that, when viewed from the east, the Nelson Monument should stand central with the Avenue; this was easy of accomplishment, but, by an obtuseness which is to be regretted, the Metropolitan Board so laid out the line of the thoroughfare that the opportunity for a little architectural effect has been lost for ever, and the Nelson Monument stands just outside the central line of the Avenue. The levels of the roadway are awkward, its junction with Charing Cross and the crossings formed thereby are as dangerous for pedestrians as any in London, and the crossings and the Avenue are very insufficiently lighted. The width of Northumberland Avenue is, on the plan for letting, shown to be 90 feet building to building, a width, with buildings properly regulated as regards height, sufficient perhaps for so short a thoroughfare, but now that the Board has permitted the excessive heights to which some of the buildings have attained, this width is, of course, insufficient. The result is that what should have been a strikingly grand Avenue, and what, bear in mind, it was in the complete power of the Board to make it, presents a comparatively tunnel-like appearance, detrimental alike to the Avenue as an Avenue, and to the buildings which line it. In Paris this absence of proportion of height of building to width of thorough-

fare would not have been permitted, and I observe that in the discussion which took place in this room on February 28th, 1881, on the Law of Light and Air, the Imperial decree of July 27th, 1859, was quoted, by which, *inter-alia*, buildings in Streets or Boulevards, 65 feet 6 inches or upwards in width, may be carried up to a height of 65 feet 6 inches, on condition that, including the Entresol, there are not more than five square storeys above the ground. The curious part, however, of this Northumberland Avenue matter is, that in the Metropolis Buildings and Management Bill, 1874, clause 70, the Board itself used its best endeavours to obtain power to regulate the height of buildings in new streets, one of the provisions being as follows:—"Where the building abuts on "a street or open space forty feet wide or upwards, its height may be not exceeding "sixty-five feet." That was the view of the board in 1874, and, although the clause was not carried, it shows the feeling entertained at the time, a feeling wonderfully well-respected a few years later in Northumberland Avenue, where 80, 90 or 100 feet in height has been permitted by the Board, and where the Hôtel Métropole and the Northumberland Avenue Hotel have been allowed to bury the building of the Society for Promoting Christian Knowledge, and to completely crush its proportions. I do not for a moment say that the two hotels should have been kept down to the height of the building just referred to, but I say that the Board, in the exercise of the powers conferred upon it, should have formed some idea of the proper average height for the buildings in this Avenue; so that, without the dull uniformity of skyline which we find in many instances in Paris, buildings of tolerably uniform height, properly proportioned to the width of the thoroughfare, might have been secured.

A wise Legislature determined that Northumberland Avenue at least should escape the stigma of absence of architectural art, so in the (36 and 37 Vict.) Charing Cross and Victoria Embankment Approach Act, 1873, the following clause was inserted:—"The architectural elevations of all buildings to be erected under this Act, fronting the "new approach to the Thames Embankment, or fronting any street to be made under this "Act, shall be submitted by the Board to the consideration of the Council of the Royal "Institute of British Architects previous to the commencement of any such buildings." As this clause contains the, what I will term, untechnical words, "Architectural Elevations," it was, I presume, drawn by a Parliamentary solicitor, whose humour is conspicuous. It will be observed that "consideration" only of the designs, not *approval*, is provided for, and the interpretation placed upon this word by Sir J. McGarell-Hogg, in the House of Commons, as reported in *The Times* of May 11th, 1883, shows that he at least appreciated the witticism; for, according to the report referred to, he used the following words:—"The design for the Hôtel Métropole³ was submitted to the Institute of British "Architects, as required by the Act of Parliament, but after due consideration the "Board did not think it necessary to put the tenant to the expense of carrying out the

³ The Council of the Institute did not suggest any specific alterations of this design. The words of the opinion sent to the Metropolitan Board in reference to it were—"the design of such building, more especially as regards the portion above the ground storey, is unworthy of its intended position," and "the said design should be considerably modified before approval be given to it by the Metropolitan Board."

"alterations suggested by the Institute, having regard to the fact that the plans for "the building had already been amended, in accordance with the recommendations of "the Board's architect, who was himself then a member of the Council of the Institute." So that, after the public have been cajoled into the belief that the Council of the Institute were supervising the designs of the buildings to be erected in Northumberland Avenue, it would appear that the Board does not care a brass farthing for the Institute, for has not the Board's own architect recommended approval of the designs? Was not the word, "consideration" not *approval*? and what could be nicer than the buildings erected in the Avenue? Stone is used in the majority of the elevations, which stone has, I presume, been approved by the Board. Well, there's stone *and* stone, but whether or not the stone passed by the Board is the best for the London atmosphere, and how long it will be before it blackens or decays, is a question which will probably be soon answered.

Oxford Street to Shoreditch.—The Metropolitan Street Improvements Act enabled the Board to make certain new streets and street improvements within the Metropolis; very large powers being conferred upon the Board as to the acquisition of lands which, in its wisdom, it might desire for those improvements. There is a street improved by the Board, running from Oxford Street to Shoreditch, but very few are aware of this, because it commences at the east end of, but not in a line with, Hart Street, Bloomsbury, and at Southampton Row the new thoroughfare is blocked from visual line by a large Fire-engine Station of the Board's own construction. Some widening and other works carry the thoroughfare to Clerkenwell Road, where, for ten years or more, the vacant plots of the Board have been lying idle, being used as repositories for rubbish of all kinds. Many unsightlinesses, in the way of backs of old houses, old party-walls, partially demolished tenements, &c., have been opened up and left by the Board to embellish the new roadway, till it reaches the Goswell Road, where it again loses itself, because it does not line, as it should, directly with Old Street. Thus what might have been a splendid thoroughfare, carrying out the only object of its construction, namely, the relief of Holborn of some of its traffic, is little used, because the Board has made a "Street Improvement," which has not a clear commencement, a good line, or a satisfactory ending.

Gray's Inn Road.—An improvement recently made by the Board is in Gray's Inn Road, by widening the east side from Holborn to Clerkenwell Road. But here again, according to the plans for letting, backs of old wretched tenements and courts, with all their objectionable features, were shown as remaining to disfigure the neighbourhood, and to be kept from falling only by those shores which the Board has been compelled to fix to sustain them. Is the following a clause which should appear in conditions for letting land cleared by the great improving authority in London? but so it reads in the conditions for letting the plots fronting the Gray's Inn Road:—"The intended lessee shall, as regards "any part of the ground to be comprised in the said contract upon which any shores or "struts may have been placed for the purpose of supporting, or which support any "adjoining land, building or erection, take the ground subject to the shores or struts "thereon, and subject to all rights of the owners, lessees, and occupiers of adjoining land "and buildings to support, and shall exercise all due care in removing such shores or

"struts both as to time and manner of removal and otherwise, that damage do not arise
"to any such adjoining land, building or erection, and shall, if necessary or proper, supply
"other adequate support to any such adjoining land, building or erection, &c., and shall
"keep the Board indemnified against all claims." I say, is that the way to treat clearances?
to leave the intended lessee to deal with shores, &c., absolutely fixed on the vacant land to
be let by the Board? Is it likely that a proper price can be obtained for land let under
such conditions? Add to this, that the Board has not constructed vaults under the footway,
nor a subway under the roadway, and the incompleteness of one of the last schemes of
the Board may be said to be complete. What could have induced the Board to construct
this thoroughfare without at the same time constructing the vaults and subway, which it
considered so very important an improvement (and it is a most important improvement)
under the thoroughfares of the Victoria Embankment, Queen Victoria Street, Garrick
Street, Southwark Street, Commercial Street, and Northumberland Avenue, and, I see
with pleasure, under the new street from Piccadilly Circus to Oxford Street, only the
Metropolitan Board could satisfactorily explain; at any rate the result is that the new
footway in the Gray's Inn Road is now being taken up for the construction of the vaults
to the new buildings, and the new roadway must be broken up when anything is required
to be done to the sewers, water pipes, or gas pipes, the traffic stopped, and the homogeneity
of the metalling for ever lost. In October of last year, only a few months after the opening
of Gray's Inn Road, the new footway was taken up in a large number of places, at equal
distances, to effect the planting of trees. The paving taken up was considerable, it was
broken to pieces in the operation, the joints of that which is left occur just as they may,
small strips and large strips are left around the square spaces, the whole footway is damaged,
money completely wasted, and a lamentable want of foresight exhibited. This is not,
bear in mind, the work of amateurs; it is that of an experienced Board of thirty years'
existence. When property has been cleared for the purposes of a new street the frontages
are offered to be let by tender in plots set out by the Board itself. The Board, therefore,
has the power to so plan the sites that cross thoroughfares of proper width, and plots of
sufficient area for the erection of healthful buildings, could be left. This being so, plots
in Gray's Inn Road were set out on the plans, leaving distances of 4 feet, 5 feet, 6 feet,
and 8 feet respectively, between the sites for the new Artizans' Dwellings and the old
houses, which were shown on the plans to be left standing. Another plot was only 15 feet
in depth, and another 34 feet by 4 feet 6 inches. This outlay is shown in Illustn. ii.
While on the subject of setting out of plots I will mention another (though not in the
Gray's Inn Road) where the Board and the vestry of St. Luke's seem to have muddled
affairs, and left a plot which is about 115 feet in length, and 10 feet 9 inches in width,
this slice of land standing in such a position that it should have been thrown into the
widening of Roscoe Street, or better still, the houses on the north side taken down, and
the whole area, including the plot shown, thrown into Roscoe Street. This is very
clearly, I think, demonstrated in Illustn. iv. At all events, having been so left, it
should now be treated as an open space for children to play in. Only a Metropolitan
Board could tell what sort of structure could be placed upon a site 34 feet by

4 feet 6 inches, and costermongers have determined a use to which the plot in Golden Lane can be put, and that is an asylum for their barrows. In the meantime this choice building plot is left as a refuse hole, to the detriment of the neighbourhood. As most of my hearers are aware, some of the vacant plots of land fronting Gray's Inn Road are now being built upon. At the time the particulars for letting were issued I pointed out in *The Times* the cruel manner in which the plots and thoroughfares were set out, particularly with reference to St. Alban's church. Since then I have seen in the library of this Institute a plan prepared by Mr. Lewis H. Isaacs, whose proposed outlay is shown in Illustn. iii. I invite particular attention to that part of the design of Mr. Isaacs, by which a 40-feet road is shown, lined with trees on each side, by which St. Alban's is opened up to the Gray's Inn Road, and is surrounded by open space planted with trees. The west front of St. Alban's church is of good architecture, and the effect of Mr. Isaacs's proposal would have been all that could be desired. Now the opportunity is lost, and for ever. In addition to this most wicked shutting in of St. Alban's, a glance at Mr. Isaacs's plan will prove its immense superiority over that of the Board; the one indicates a business-like and practical grasp of the Improvement Scheme, the other a niggardly, weak and blundering outlay, detrimental alike to the public interests, and to the financial success of the undertaking. At the south-eastern corner of Gray's Inn Road a new building was some little time ago erected, with a considerable frontage to the Gray's Inn Road. There can be little doubt that the main front wall of that return constitutes the "line of frontage of the new "widening;" and this being so, the very first building erected next to it has been allowed by the Board to project a few inches in front of it. I am quite at a loss to understand upon what principle the Board acts as regards lines of frontage. I quite agree that it is not desirable that all the wall surfaces in a street shall be in one plane, without break to give effect of light and shade, and of variety, but this effect should be obtained by recessing the main line of wall, and the bringing out of piers and projections only to the line which should constitute the general line of frontage. In many cases the piers and projections take up so much of the area of the whole front, that they and not the wall surface should be determined to be the frontage line.

Piccadilly Circus to Oxford Street.—This new street and that from Charing Cross to Tottenham Court Road were, no doubt, intended to take up the line of the new street from Oxford Street to Shoreditch, but because a public house and a gin distillery stood in the way of a proper and direct line, the new street from Piccadilly Circus has been pitched into Oxford Street at what is nearly a right angle, the public house and distillery remaining to grace the new opening and to utterly destroy the good effect of that part of the scheme. There is a small triangular piece of ground left at the opening into Bloomsbury Street, which the Board has dedicated to the public as open space. For this it deserves our hearty thanks, and the hope that so excellent a precedent will, in many other instances, be followed. After very considerable struggling, this new street finds itself, apparently very much to its own surprise, breaking into Piccadilly Circus. It has opened up in its tortuous windings some curious and picturesque remnants of dilapidated architecture,

which may have been scheduled to be taken down or may remain to front the new street. I do not know; but, as one entire side of that well-known feature of St. Giles's, namely, Dudley Street (late Monmouth Street), remains up to front the new street, I should not be surprised if the unsightly portions of building on the other side were also to remain. It would I think be difficult to find, even in St. Giles's, houses very much worse than those in Dudley Street, which have the horrible and well-known underground cellars, and are, I should say, as much in need of demolition as any yet taken down by the Board. Yet they are to be left to front this new street, to put a large sum of money into the pockets of their owners, and, at the same time, and for the same reason, to take it out of those of the ratepayers. Again at that part of the widening and improvement works in Soho, the Board has permitted the erection of those huge blocks of artisans' dwellings, with a width at one part of only 13 feet 3 inches between the buildings and the face of the old houses in Newport Court, instead of the 20 feet which, at the very least, should have been insisted upon next such terribly old houses. The whole of these new thoroughfares, I have no doubt, will prove very excellent cab routes, and we are not as yet able to speak of the architecture which will grace them. I should, perhaps, have been tempted to speak of the quality of the architecture of the New Artizans' Dwellings and Model Lodging Houses, erected in connection with these improvements, had I not observed in *The Times* of August 27th last, a criticism which renders further comment unnecessary. It runs thus :—"On the site of Newport Market, notorious for everything bad and disreputable, have been erected two splendid blocks of buildings for the accommodation of the working classes, one by a private speculation and called 'Newport Dwellings,' and the other by The Improved Industrial Dwellings Company called 'Sandringham Buildings,' a suite of erections of handsome elevation, with no appearance whatever of model buildings, having large shops on the ground floor, with the upper portion allotted in suites of two, three, and four rooms. There is every possible accommodation and sanitary appliance." I need only add that the Board is indebted for this kindly notice to that indefatigable officer, Mr. Superintendent J. H. Dunlap, of the C Division of Police. But it only needs a cursory glance at these belauded buildings, which, in my opinion, discredit what is to be a chief metropolitan thoroughfare, to measure such praise at its true value.

Tichborne Street and Piccadilly Circus.—The last of the works of the Board, which is of great interest to Londoners, is the laying out of the open space left after the demolition of the houses on the triangular piece of ground between Tichborne Street and Piccadilly Circus. The Board deserves the greatest possible credit for its resolution to preserve, as an open space at this important part of London, the ground so cleared, instead of building on either side of the new thoroughfare cut through it, as was, I think, its original intention. By this one act it has saved itself from a reproach which might have cost it its existence, and it has shown that when boldly and courageously taken in hand, improvements in the way of providing open spaces can be carried out by the rulers at Spring Gardens. Grateful, however, though we may well be for this open space, the details of the arrangement afford glaring evidence of the want of consideration which again, as regards

lines of frontage, characterizes the works of the Board. The avoidance of the Trocadero Saloon or Eden Theatre on the one side, and Hendries', the perfumers, on the other, has necessitated a curve in the street which renders the projections and encroachments of the south front of the new Pavilion Music Hall most striking and most objectionable. It will be borne in mind that this line of frontage was in the complete control of the Board, and my *Illustn. v.* shows how the Board has taken advantage of the powers conferred upon it. The south-east angle of the new Music Hall prominently projects and completely shuts out Coventry Street from the view from the west; the injury done by that jutting out has been further increased by the central feature of the southern façade being allowed, for a length of 52 feet, to project 6 feet beyond the general line of the south front, and another important projection has also been permitted on the west front. In front of the latter projection, by which the footway has been so much narrowed, there have been allowed to be set up four lamp-posts, standing about 2 feet 6 inches on the footway. Thus, where for purposes of entrance and exit to the Music Hall the width should have been great, and no encroachments such as these lamp-posts have been permitted, the width of clear footway in front of a building in such an important situation, the lines of which were set out by the Board itself, is reduced to about 7 feet 6 inches. Similarly placed lamp-posts are also to be found on the footway of the south front, the width in one of the finest parts of London and at the entrance to a Music Hall being thereby reduced to about 11 feet 6 inches. On the east front, the footway was so encroached upon by the piers of the new building and by the building itself that, immediately after the new footway and roadway were laid, both had to be taken up, the footway widened, the roadway narrowed, and all because the Board, with its eyes wide open, permitted an encroachment which the least consideration would have shown it would have so narrowed the footway as to render it totally inadequate for the public traffic. I have shown on the plan, by a dotted line, the limit beyond which, in its main frontage, the Pavilion should certainly not have been allowed to project—giving it the benefit of the central feature—and I leave it for the Board to explain its reasons for thus marring a grand improvement, and for its entire disregard of the public convenience and of the embellishment of the Metropolis. The plan [*Illustn. v.*] indicates generally the open spaces and footways as now set out by the Board at this fine part of London; if, after a study of that plan, my hearers consider that it is worthy of the situation, I am sure that the Board would be grateful if an early recognition of the fact were conveyed to it.

Coventry Street, &c.—The Metropolis Management and Building Acts Amendment Act, 1878, enacts that 20 feet is to be the width of every new road-way used for foot traffic only, and 40 feet for a roadway used for carriage traffic, and the by-law, made by the Board under that Act, further develops this by the following words:—“Forty feet, at the least, shall be the width of every new street intended for carriage traffic. Twenty feet, at the least, shall be the width of every new street intended only for foot traffic. Provided that the said width respectively shall be construed to mean the width of the carriage and footway only, exclusive of any gardens, forecourts,

"open areas, or other spaces in front of the houses or buildings erected, or intended to be erected in any street" "but where forecourts or other spaces are intended to be left in front of the houses or buildings, then the width of the street as already defined, shall be measured from the centre line up to the fence, railing, or boundary, dividing, or intended to divide, such forecourts, gardens or spaces for the public way." Now this is all very good, and perfectly clear in description and intention, and the well-known Engineer of the Board, in his admirable Address delivered at the Institution of Civil Engineers, on January 8th, 1884, says, that to secure the free admission of light and air, no street should be of less width than 40 feet, and not less than two-thirds of the height of the houses surrounding it. The widening of Coventry Street was not long ago carried out by the Metropolitan Board, and the surplus sites let for building; but, regardless of the spirit of the Act of 1878, of its own by-laws, and of the opinion of its own Engineer, the Board has allowed the erection of buildings on each side of a thoroughfare for foot traffic, just west of the Prince's Theatre, leaving a width of 16 feet 3 inches only, instead of the 20 feet provided by the Act; and it has allowed even this 16 feet 3 inches to be further impinged by the construction of a circular projection at the angle of the building at the north-east corner, further reducing the width of the thoroughfare. It is true that the new frontages take up the lines of the old (except the circular projections), but, as the buildings are upon new sites at each corner of the thoroughfare where it branches into Coventry Street, it is obvious that the Board could have secured a width at least equal to that demanded by its own by-laws, and then, ultimately, the whole thoroughfare could have been increased to that prescribed width. Oxendon Street, a thoroughfare for carriage traffic, has been allowed by the Board to have a width at the entrance into Coventry Street of 39 feet 3 inches, instead of the 40 feet, at the least; and this, too, in a street with a theatre at the corner, where, above all others, good width is needed. In this case also the new buildings have taken up the line of the old, but the Board should have set back its building sites at the entrance into Coventry Street to provide for future widening, as indeed it has done further east, where Whitcomb Street has been widened at its mouth; and in due time the western frontage lines will, no doubt, be set back to the improved width, whereby a decided improvement will be effected.

Improvements carried out by the Metropolitan Board are public improvements paid for by the public. Its operations, therefore, must not be confounded with those of a private landlord, who is quite entitled to hold out for as much as he can get for his land. It is quite lamentable to walk through many of the thoroughfares made by the Board. The plots are lying as receptacles for rubbish and filth, to the detriment of the health of the neighbourhood, to the perpetual drag on the pockets of the ratepayers, and to the general deterioration of the character of the neighbourhood; and all because the Board holds out for rents which it is difficult to obtain, which it has not obtained, rents which offer no inducement whatever to speculators, builders or others to become lessees or owners. I say that the Metropolitan Board of Works does not meet its position as the acting representative body of this grand Metropolis of a grand country. Many of its so-called

improvements are not improvements at all, except as traffic routes, and not always so; it does not always remove the squalid and unhealthy dwellings which it fringes but leaves to disgrace its own new streets; it does not always justify financial success by enhancing the value of the ground which it throws into building area; it does not secure, in its controlled architecture, embellishments worthy of the situation. On the contrary, the Board, proceeding in a niggardly, timid, half-hearted way, oblivious of Imperial considerations, desirous of selling its interests at the earliest moment and ridding itself for ever of its schemes, fails irretrievably to realize even a tithe of the great expectations which were formed at and after its creation more than a quarter of a century ago.

THE SITE OF THE PROPOSED ADMIRALTY AND WAR OFFICES.

Our President, in his opening Address a fortnight ago, referred to the subject of these new Public Offices, principally with reference to the inadequacy of the site for both the buildings. I do not propose to add one word to what has been said on the subject of the buildings, but intend to confine myself to their proposed disposition upon the site.

On one of my drawings⁴ are two plans, one showing the Offices as laid down upon the model exhibited in August and September last, at No. 18, Spring Gardens, the other a plan prepared by Mr. John Robinson and myself, showing the manner in which we propose that this part of Charing Cross should be treated. By the plan of the Office of Works it will be seen that Drummond's Bank and the few houses southward, up to Cocks and Biddulph's Bank, are retained to mar the fine stangle of the new buildings, that 50 feet only is the distance between the north-west angle of the new building and the railing of the garden in front of the Metropolitan Board of Works, and that a block of proposed "Residences," distant only 77 feet from the northern front of the new buildings, stands absolutely in the line of the eastern view, and effectually shuts out any glimpse of the park which might otherwise have been obtained. By our plan it will be seen that although Drummond's Bank and other houses are retained, the proposed "Residences" are wiped out, that the northern front of the new Offices is planned to obtain a proper width of avenue at that point, that an ornamental garden is formed opposite the Metropolitan Board of Works, that at Charing Cross the avenue is entered through what might be, if wished, a triumphal arch, and through which, in a line with the Strand, would be opened up a magnificent vista to the Mall of St. James's Park. What, however, we should if possible secure, is the removal of Drummond's Bank and the few houses to the south of it, by which means the Offices could be extended northwards, and the widening of Charing Cross, at a part where it is essentially in need of widening, be formed. This alternative scheme is shown by a dotted line on our plan,⁴ and marked A. Thus would a grand opportunity be grandly met, thus would Londoners see how easy it is to make London beautiful, if they will only insist upon the execution of a good scheme when it is brought before them. Let us then fervently hope that this time the public will, with one voice, insist that the

⁴ These two plans are published in the Journal of PROCEEDINGS, Vol. II., New Series, page 60.

Office of Works plan shall not be carried out, that after all it is possible that there are one or two men left outside that office who are capable of wisely advising those within it, and that whatever comes—whatever Government is placed in power, they are determined that even if Drummonds' Bank and other buildings be retained, which they certainly should not be, a broad avenue from Charing Cross to the Mall shall be formed. Mr. R. W. Edis said in this room, the other evening, that the matter should be brought before the public. He did not, however, indicate how he would bring it before the public, and it is probable that he is not aware that, throughout September last, the whole subject was fully discussed in the newspapers with the greatest possible spirit; and, moreover, there exists a pamphlet⁵ containing the greater part of that correspondence, to which I direct the attention of all who care to know what has been said.

THE CORPORATION AND LINES OF FRONTAGE.

Adjoining Mr. De Keyser's Hotel, on the Embankment at Blackfriars, stands one of the most imposing and beautiful buildings recently erected in London. It is the City of London School, erected for the Corporation of London. A skilful masking of what was for many years an eyesore to everyone passing along the Embankment, namely, the west party-wall of the hotel, was obtained by the architects of the School in the semi-circular annexe which they formed to their main building, and an unusual but highly to be commended regard for London thoroughfares and London requirements was exhibited in the setting back of the line of frontage to the extent we know. Immediately to the west of the School the Corporation of the City possessed vacant building ground, and the portion which now concerns us was let or sold to Sion College. It will be seen [Illustrn. vii] that a projection has been brought out on to the very line of the footway of the Embankment, thereby cutting off the view from the west of the School building, and it will be remembered, at the same time, that the Corporation of the richest city of the world, in order to gain a paltry—it is really a paltry—addition to the ground-rent, has permitted this to be done. What can be said in the case of small freeholders allowing what should be forecourts, to be built upon, when one finds the Corporation, Sion College, and their distinguished architects combining to deprive Londoners of open space, to mar the effect of a noble building, and to injure the lines of a magnificent thoroughfare. Surely the Metropolitan Board of Works could have stepped in, and on the point of "line of building frontage," stopped this latest scandal! I cannot understand the principle upon which the Board works as regards lines of building frontage, nor do I know whether it adopts any rule at all. I do think, though, that the case I have just mentioned is one calling for severe censure, and that the censure should extend to the length of compelling the pulling down of the projection shown on the plan, and the setting back of the Sion College building to the same line of frontage as that of the City

⁵ *A Protest against the Amended Design for the proposed Admiralty and War Offices, addressed to the Rt. Hon. George J. Shaw-Lefevre, M.P., the Rt. Hon. David Plunket, Q.C., M.P., the Most Noble the Marquis of Salisbury, K.G., and the Rt. Hon. W. H. Smith, M.P., one of the Judges in the late Competition &c.* 80. Spottiswoode & Co., London.—W. W.

of London School. Decided protest in this matter is the more necessary as I observe that the conditions and plan of letting sanction the erection of a ground and mezzanine story, to be built all along that long line of frontage to the Embankment, that there is no limit of height stated within which those two storeys are to be kept, and that there is no provision whatever in the agreement, for controlling the elevation of the returns of any new buildings which may be put up. Thus the interests of London have been neglected, first, by the wilful concurrence of that Corporation which should endeavour, by every means, to deserve well of its admirers, and secondly, by the neglect of the Metropolitan Board to look after the finest thoroughfare it has yet formed.

THE AMENDMENTS NEEDED.

Drains.—The Metropolitan Board of Works has provided good main sewers capable of intercepting daily 63,000,000 cubic feet. The total length of these intercepting sewers is 82 miles. The engines at present used in pumping are of 3,530 nominal horse power, and have required about 22,400 tons of coal during the 12 months ending September 30th, 1884. The cost of the Main drainage works is estimated at £4,607,000. Money certainly well-expended, and if, in addition to the above particulars, we bear in mind that the Vestries and District Boards have obtained the sanction of the Metropolitan Board, from the year 1856 to the year 1883 inclusive, of 1,081 miles of new sewers, we can form an idea of the magnitude of the sewer works of London. The next important step then is to see that cost and trouble are not in any way spared to secure the strictest compulsion of perfect drainage into the sewers so provided. Probably no subject has arrested public attention with greater force, during the last ten years or so, than that which comes under the generic term Sanitation. A great deal of the interest which has been and is being taken in that subject is the result of a mild form of panic, and there have not been wanting those who are generally at hand ready to respond to such situations, by encouraging the dread; in this case putting forward every conceivable form of apparatus warranted to remove the ground of the fears, and to convert what they had termed a "pestilential hole" into a model dwelling charged with nothing so much as pure and fresh air. Men have sprung up, dubbing themselves "Sanitary Engineers," who yesterday hardly knew the difference between a drain-pipe and a red-ware chimney pot. They talk for the hour on traps, ventilating pipes, cowls, disconnectors and valves; they make horrible pictures and exhibitions of old lead D traps and iron containers; they get into your houses with their crude and experimental ideas; they describe and order with vehemence one day what they countermand the next; they fill your corners with pipes the use of which they are not quite sure of, and which certainly nobody after them will ever understand; and when a sum of money about equal to that which was expended on the erection of the house has been paid, they will leave the unhappy owner to discover, shortly after, that the ideas as to ventilating pipes and other sanitary notions, which have cost him so much to attain, are already obsolete, and that if he wishes to place his house in exact accord with the real sanitary scientific discoveries of the day, he must begin *de novo*.

Not only "Sanitary Engineers," however, but "Professors of Sanitation" have sprung up, whose word is regarded with as much awe as that of a physician in a case of life and death. These men (I am not at all referring to those few professors who have devoted themselves to questions of sanitation, and who have a real knowledge of the subject) use more alarming words than the "Sanitary Engineers." "Smell" they convert into "gas," and the word "germ" will be found to be one in their vocabulary of which they make pretty good use. These are, of course, the humbugs of the day, and are not to be confounded with the earnest workers who, without show and at half the cost, do all that is necessary to make a house healthy; and in speaking of earnest workers in sanitary matters, it is impossible to avoid mentioning the name of S. Stevens Hellyer, whose publications on Sanitary Plumbing are real "text books" for all, as they have been the reference books of some of those who, having perused and prigged, set up as professors of sanitation, proceed to mutilate, and ultimately to murder, the practical ideas set forth, in works the execution of which, from want of knowledge, they are unable properly to direct. Now it cannot be too strongly impressed on the public mind, and especially on that large contingent of the dwellers in this Metropolis whose purses are not always filled to the brim, that to make their houses fairly safe from dangerous inroads of sewer gas, as it is termed, is not by any means a gigantic undertaking. In the case of a new house an architect of ordinary professional capacity is quite alive to the modern ideas of sanitation, and he will no doubt see that, so far as his client permits him, all that is proper to be done is thoroughly carried out—he has all the ground before him, he can see if he likes that the drains are laid and jointed as they should be, and generally dictate exactly the plumbing items of sanitation. The difficulties, however, which beset an architect (and I say architect because "sanitary engineers" and "professors of sanitation" are not by any means necessary) become apparent when he has to deal with an old house, the drains of which he knows nothing whatever about; but even here the task of securing safety from poison from the sewer is not such a very hard one.

Take an ordinary street house, open at the front and back, but closed in on either side by party walls. The w.c. apparatus is of the old kind, set in an apartment in the centre of the house, without any communication with the open air. The sink waste is directly connected with the drain, supposed to be protected by an old bell trap, which is of little use, the cistern has the old standing waste pipe, also directly connected with the drain, and serves the sink as well as the w.c., the rain-water pipes are also directly connected with the drains, which run under the kitchen floor or basement passage, and uninterruptedly on to the old iron flap trap, which, if it exists, is the only opposing force to direct contact with the main sewer which runs along in front. Now this is, apparently, a very alarming state of things, to be remedied only, the Professor of Sanitation would say, by the removal of pipes, cisterns and apparatus throughout the house, involving perhaps the dislocation of everything in it, and the substitution of the net-work of arrangements which I have previously referred to. I am not for one moment urging any objection if the client is willing to carry out these elaborate notions and can afford to pay for them, but I speak for the larger class, and tell them that the following will, in

ordinary cases, be sufficient to arrest danger, supposing that the w.c.'s, sinks and cisterns are in a proper state of repair, and that there is not any stoppage in the drains or other pipes. Take up the paving of front area where the main drain runs through to the sewer, cut out a length or so of pipe and build, in 9 in. work, a shaft 3 feet by 2 feet, render it all over inside in Portland cement, at the bottom let in a half drain pipe, and at the sewer side fix a Weavers' or some other syphon trap, connect with the shaft two 4 in. drain pipes, one on either side of the shaft, or carry up a 4 in. galvanized iron pipe a short distance to form inlets, and if a rain-water pipe is near at hand caulk the joints, connect it with the shaft, carry it well up above the roof and treat it as the outlet ventilator: if one is not near at hand, carry up, well above the roof, a separate 4 in. galvanized iron ventilating pipe. Cover the shaft with a York stone, or iron, cover, and the drain job is done. As regards the water supply the cistern should be well cleaned out periodically, say once a month, and there will not be much to fear in that direction.

Fortunately, drainage into cesspools may be considered as now obsolete in London, but it would be too much to assert that cesspools do not now exist. Probably many a good old house has its old cesspool full to the brim at this moment, disused and hidden away under its passage or cellar floors, throwing off smells which are sometimes attributed to other causes. Only a few years ago I had to investigate the cause of a horrible smell which arose from the basement of a house in the Regent's Park, and, on opening up the passage, I found the old brick barrel drain quite full of solid matter; the cesspool, which was under the paving of one of the front vaults, had not been emptied for years, indeed, its existence even was not known, therefore, when the drain inlet level was reached, it only became a question of time to fill the brick drain itself, and thus arose the horrible smell which led to my visit. This is a condition of matters which exists, no doubt, in perhaps a little less full form, in hundreds of the best houses in London, and shows the necessity, in any clearance of sites for new buildings, that the whole of the sub-soil, to a level which would with certainty be below an old drain, should be cleared out, because, when the system of pipe drainage came in force, and connections were made with the new sewers, many of the old cesspools and brick drains were left as and where they were, to avoid the cost and trouble of clearance. Another case which came under my notice, but this time at the East end of London, disclosed the fact that a pipe drain from the privy in the back yard was not, nor ever had been, connected with the house drain at all: it discharged under the yard ground about three feet from the privy, and about three feet from the back kitchen window, where the soil had soaked into the ground and found its way where the earth was most friendly. In the same house I found that a pipe drain ran under the floor of kitchen, and that the joint of two lengths had never been connected at all, the lower edge of the pipes touched, but the upper part showed at the top an opening of two inches, with a result which can be imagined; the unfortunate residents of the kitchens were always ill, and just before I surveyed the drains, a poor woman had died of typhoid fever. These are only two examples from my actual experience, but others of a similar character could be mentioned.

Unquestionably constant supervision during the laying of drains is most essential, and the following points should always be observed :—

1. Care should be taken that all old drains and cesspools, and all soil which has been in contact with any old brick drains or cesspools, be removed from the premises.

2. Large drains should be avoided. It has been proved, beyond all doubt, that matters easily carried away by the increased velocity gained by using a small drain, remain as an obstruction in a large drain. As a rule, branch pipes 4 inches in diameter, either for soil or surface water, are sufficient for any ordinary house and, where they come into the length of main drain before entering the sewer, 6-inch pipes are of ample diameter.

3. Care should be taken that the joints of the pipes are carefully cemented or clayed-in all round, and that not the least particle of cement or clay is allowed to remain on the inside of the pipes, as, when it is hard, an obstruction to direct flow arises, gradually increasing until at last the drain is stopped up, or else foul matter remains in the drain, which must in time make itself felt.

4. Junctions should never be made at right angles with the drains, as by this the flow of sewage is directed with velocity against the surface of the pipe immediately opposite, and the risk of accumulation there is very great. Junctions should always be made at a gentle curve or bend with the length of the pipe.

5. Uniform and regular fall should be secured—not too great a fall, because that rapidly carries away the liquid soil, whilst the solid sometimes remains, and the liquid passes over it, causing serious consequences. In some cases, old drains have been found laid to reversed inclinations, showing the care required in superintending drain laying.

6. The joints of all pipes should be socketted, and care should be taken to give the pipes a full bearing on the foundation, and not allow the bearing to be only on the socketted joint. To this end channels should be cut in the foundation, at every length of pipe, to allow the projection of the socket to rest in them.

7. All drain pipes should be laid on a solid bed of concrete, or else on well-tempered clay puddle, formed to suit the shape of the pipe.

8. All traps in drain pipes should be earthenware syphon traps, with inlets and covers, so laid and constructed as to be ready of access for cleaning out.

9. Special traps—grease traps—should be provided in connection with all scullery sinks, so constructed and laid as to be ready of access for periodically removing the accumulation of grease.

10. Wherever possible, drains should be laid outside the house, but, when this is not possible, the line and direction of the drain should be indicated on the floors by the material being laid, in line of drain, of sufficient width to obtain complete access to the drains when required. If the floor is of wood this can be done by laying the boards between fillets, and fixing them with screws, so that they may be taken up without destroying the floor boards. If the floor is of stone, a tooled York margin (slips of paving laid on edge) could be laid on each side of the stones, representing the trench where the drains are laid. This would save great trouble in after years, when otherwise all knowledge of the position of the drains is lost.

11. It is desirable for the important part which *flushing* has to play in all systems of drainage, that the waste water from sinks, baths, rain-water pipes, &c., should be allowed to pass down the house drains. It has now become the fashion, in some quarters, to lay down two distinct lines of drains—one for the soil, the other for the water from rain-water pipes, sinks, &c., but the evil of this is apparent when it is borne in mind that very little water accompanies the one emptying of a water closet apparatus, and that, therefore, there is great danger of soil remaining in the drain pipes, an evil which is avoided when the other large bodies of water are conducted into the drains.

12. Wherever a junction of pipes occur, there should be constructed a brick shaft, say 3 feet by 2 feet, with a stone cover, to allow of access to it, so that rods may be passed up and down the drains in case of stoppage.

13. Before the drain enters the sewer, and outside the house, there should be constructed a brick shaft 3 feet by 2 feet, with stone or iron cover, with syphon trap on the sewer side of the shaft, with inlet ventilating pipes, and outlet ventilating pipes, as previously described.

Ventilation of Drains and Sewers.—The question of ventilating drains is now pretty well understood, and I observe that at a meeting of the City Commissioners of Sewers, held on the 23rd of September, 1884, it was resolved that, in all instances where new houses are being erected, the Commissioners of Sewers should place themselves in communication with the builder or the owner, and treat with him for the construction of a proper ventilating shaft for the purpose of ventilating the sewers, carrying the shafts well over the adjoining roofs. This resolution shows, at least, a very laudable desire on the part of the Commissioners of Sewers to do all in their power to improve the health of the City under their charge; but I fear that this question of ventilation has hardly been considered with sufficient reference to one phase of it, and that is—what will the effect be upon the health of the metropolis, if each house has its ventilating pipe, discharging over the roof, high or low as the case may be, and the main sewers remain as they are without additional ventilation? It must be borne in mind that the main sewers, although very good, have constantly added to them the results of the great increase in the population, and that additional ventilation of the sewers does not appear to be in progress, or to be contemplated. That being so, it may be feared that, although by care in the construction and ventilation of house drainage, the foul smells or gases will pass out at the ventilating pipes, there will be the risk of the whole atmosphere of the Metropolis being poisoned by the discharge of offensive odours from the ventilating pipes of 685,000 houses. This important point, then—the effect upon the atmosphere of the offensive odours from the largely increased number of ventilating pipes, must in a short time be dealt with; it is bad enough to be prostrated from the smells in one's own house, but it is doubly irritating to be poisoned in the streets from the smells of other persons' houses. In certain conditions of the weather, and particularly in foggy weather, disagreeable smells would descend with serious effect upon the health of the inhabitants. This fact of descension of foul odours in certain weathers will render the erection of shafts to

ventilate the sewers undesirable ; the whole question, then, of sewer ventilation resolves itself into this, that by every care, trouble and expense, which so serious a subject demands, the State must effectually secure that bad matter of all kinds is immediately and rapidly removed from the sewers, and carried right away to the sea.

The Water Supply.—The annual report of the Local Government Board for 1884-85 furnishes some very interesting statistics with reference to the sources of our Water Supply, and I suppose that no subject can be of more vital importance to the dweller in this metropolis than its water supply. We are all aware that during the last year or two many complaints have been made as to the foul condition of the River Thames by reason of the discharge of the metropolitan sewage at Barking and Crossness, and the following extract from the report made to the Local Government Board by Mr. John Thornhill Harrison will be heard with interest:—

“It is probably no exaggeration to say that at the present time (August 1884) there is a month’s sewage from the Metropolis oscillating between Greenhithe and Teddington. It is evident that the foul water from below Deptford must during spring tides reach as high, or even higher than Putney Bridge. The water during high spring tides is polluted even up to Richmond, and it leaves a foul deposit on the banks of the river and on the towing path. This nuisance is complained of by the Richmond people. The Thames in its present condition can only be compared to a huge sewage tank which for now many months has not been cleaned out. It is notorious that under such circumstances the sludge, whenever it settles, becomes putrescent and most offensive. The gases generated diminish the specific gravity of the sludge, and raise it in patches to the surface. The Metropolitan Board of Works deny altogether that there is any deposit of sludge in the Thames from their sewage. I feel confident that this contention is no longer tenable.”

This language is clear and, as August, 1884, has passed, there is perhaps less reason to tremble at the announcement that the “silvery Thames,” which should be the great highway of the metropolis, and the source of health and freshness, was in that month “a huge sewage tank which for many months had not been cleaned out.”

As regards the River Lea, complaints as to the nuisance arising from discharge of sewage matter into it have been of late loud and frequent, and certainly with good ground ; and it is very satisfactory to find, from the reports of the Water Examiner appointed under the Metropolis Water Act, 1871 (Col. Sir Francis Bolton, R.E.), and of Dr. Frankland, that on the whole the supply from these rivers was of a better quality during the past year than in any previous year since the present system of periodical analysis was established in 1868. The report of Sir Francis Bolton, which is printed in an Appendix to the Local Government Board Report referred to, is full of most interesting matter, and he very properly points out that notwithstanding the general effectual filtration and delivery of good water by the Companies to their respective districts, the supply frequently deteriorates after having been delivered by the Companies into the foul cisterns of the consumers. To remedy this evil—one to which all architects should direct the attention of their clients—the steps which are being taken in providing a constant supply, and

thereby dispensing with cisterns, are regarded as sufficient; but, in my opinion, to dispense altogether with a cistern would be dangerous, as it would leave the consumer entirely without water in the house in the event of accident arising or repairs required to the Companies' mains. I would reduce the sizes and the number of the cisterns, but certainly would not leave the house without one for storage in case of accident.

Many new wells are now being sunk and extensive filtration works being constructed by the Companies, and to furnish an idea of the extent of the New River Company's operations, it may be stated that the total length of main pipes belonging to that Company alone is now 782 miles. The average *daily* supply during 1884, for all purposes, gives a consumption of 31.18 gallons per head of estimated population, and 234 gallons per house. During the past year the total average daily volume of water supplied to the inner circle of the Metropolis is estimated at 152,273,210 gallons, 76,776,956 gallons from the Thames, 65,073,927 from the Lea, and 10,422,327 from deep wells in the chalk. The water supplied by some of the Companies from deep wells is stated to have been uniformly pure and wholesome.

We have heard a great deal lately as to the effect of the decision in "*Dobbs v. Grand Junction Company*" upon the income of the Water Companies, and in a report for the year 1884 made to the Local Government Board by Mr. Allen Stoneham, the auditor appointed under the Metropolis Water Act of 1871, he states that it is difficult to arrive at any very accurate conclusion as to the effect of that judgment, but from the figures which he furnishes it may be inferred that the judgment has had considerable effect in diminishing the accruing increment of income that would otherwise have been receivable by the East London, Grand Junction, New River, Southwark and Vauxhall Companies, whilst the Chelsea and West Middlesex Companies appear to have made large additions to their income by the recent revision of their charges. The nett water rental of the Chelsea Company was in 1883-84, £103,244 13s. 1d., and in 1884-85, £109,376 16s. 9d., an increase of £6,132 3s. 8d. The nett water rental of the West Middlesex Water Company was in 1883-84, £183,652 6s. 4d., and in 1884-85, £200,268 15s. 3d., an increase of £16,615 8s. 11d.

The Metropolis Water Act, 1871, makes regulations as regards communication pipes, weight of lead pipes, stop valves, cisterns and ball valves, warning pipes, screw-down taps, waste preventing apparatus, bath waste pipes, &c. The provisions of this Act are perhaps generally useful, but probably none were so ill-considered as those relating to screw-down taps and waste-preventing apparatus. The first of these was probably inserted in the Act at the instance of the Water Companies, who, regardless of the very great benefit to the community which arises from a good supply of water to the drains, thought that, by securing screw-down taps, they would prevent waste of water, as well as concussion; instead of that, however, they have rather increased waste of water, because, whereas by the old fashioned tap, one twist of the fingers shut off the water, by the screw-down tap several twists are required before the water is completely shut off, the result is that servants and others do not take the extra trouble to screw home the taps, away goes the water, the Companies lose it, and at the same time irritation is caused

to the consumer. The second of the mistakes of the Act is the clause which provides that "every w.c. cistern shall have an efficient waste-preventing apparatus, so constructed "as not to be capable of discharging more than one gallon of water at each flush." Now had the Companies, before allowing this clause to pass, endeavoured to control the particular water-closet apparatus to be used, they might have secured one which would be effectually cleansed and emptied by the discharge of the one gallon of water, but as many apparatus are very difficult to empty and cleanse thoroughly, and cannot be so emptied and cleansed by the one flush of the water waste-preventor, the consumer either has to wait till the second and third gallon comes into the water waste-preventor, or else leave matters to take care of themselves, or (what is frequently done), evade the regulation altogether. This unquestionably absurd and insanitary arrangement has, however, been defeated by numerous dodges of cistern valves and other falsely so-called water waste-preventors, a proceeding which is connived at, and properly so too, by some of the Companies, so that in most cases sufficient cleansing supply is obtained for water closets without the irritation and annoyance which this provision of the Act first occasioned. The Water Companies have themselves issued printed regulations which are mostly very useful for the guidance of the consumer. Some of the districts supplied by the West Middlesex Water Works are favoured with a constant supply, and the Company states that it is desirable, in such cases, that the water for drinking purposes should be drawn direct from the supply-pipe, rather than from the cistern, but, for the reasons I have before stated, it is in my opinion safer to provide a small cistern in case of an accident to the Company's mains. The New River Company publish a list of the names of all plumbers who furnish proof of their being honest and "capable," and who undertake by written agreement to do all their work in the provision of water fittings within the Company's district, in strict accordance with the regulations made under the Act of 1871, and the Company's own requirements, with the understanding that on any breach of such agreement by any of the contracting plumbers, the Company will strike off the name of such defaulter from the list, and will publish the fact of their having done so. This is a very good and useful system to adopt, and all consumers should be grateful to the Company for having initiated it.

The Water Companies are private undertakings in the hands of eight Companies, viz., Kent, New River, East London, Southwark and Vauxhall, West Middlesex, Grand Junction, Lambeth, Chelsea, who supply water to the Metropolis mainly from the River Thames and the River Lea. The Metropolitan Board of Works, under the Water Act of 1871, is empowered to receive proposals for and, under certain circumstances, to require a constant supply. The total certified expenditure of the Companies up to December 31st 1884, was £13,350,285 8s. 2d. The large quantity of over 152,000,000 of gallons of water used each day in the metropolitan area is, Sir Robert Rawlinson says, pumped by engines of an aggregate power of about 13,000 horses, and about half the quantity supplied is stated to run to waste, but, in my opinion, as before stated, this is not all waste, because it answers the very important purpose of flushing the drains and sewers, and no doubt accounts to some extent for the healthy condition of London. If the

population of London increases as it has done during the last few years, it will, I think, be found necessary to economise by taking water for the Fire Brigade and street watering from some other source, or even from the Sea; it has often occurred to me that much money might be saved by the Companies if, instead of submitting to all the expenses of filtration, &c., the water which is used for the Fire Brigade and for street watering, they would bring it direct into another store and use it as so brought. It is all very well to say that we shall never be without water, but the wells upon which the Companies to some extent now rely will probably dry up in time, then it will be found necessary to find other sources of supply, and the question is, where are they? The matter therefore of the water supply of the metropolis must sooner or later engage the attention of the legislature. Water is a necessity of existence, and its supply should certainly not be under the control or in the discretion of private Companies.

Water Services.—I think that for the cleanliness and comfort of the poorer classes all Water Companies when laying on water to a newly erected house for poor persons should connect the high pressure supply to the main cistern, which should be in all cases set up at the top of the house. This would enable a sink to be supplied with water on every floor of the house. What a boon this would be to poor tired workers who come home after a day's toil, too weary, perhaps, to go all the way to the bottom of the house for a pail of water, and too weak, perhaps, to carry it up when obtained! Every sink should be supplied with a proper waste pipe leading to a trap, or pit, at the bottom of the house.

Slop Sinks.—A slop sink should be fixed on every floor of every new house erected for poor persons. This should be made of earthenware, with an earthenware syphon trap, and a spring-hinged cover. What a boon this would also be to the tired and weak worker, and how conducive to cleanliness in the w. c.

Water Closets.—In every new house erected for the poorer classes, where there are at least two separate tenements on a floor, one water closet at least should be fixed on each floor. The apparatus should be of the simplest and strongest kind, and the pan and trap should be of earthenware in one piece. The floors of the water closets should be finished with cement, or some other hard and water-tight material, carried under the seat, and up against the walls as a skirting. The riser of the seat should be kept away from the floor about six inches, so as to enable the whole surface of the floor, including that under the seat, to be kept quite clean, and free from offensive accumulations. The walls of all water closets should be finished in Portland cement, so that they may be distempered, and periodically redistempered, the cost of which would be so trifling that the operation might be repeated at frequent intervals. No water closet should be fixed outside a house, access to which can only be obtained by exposure to the weather. The inconvenience and danger when, perhaps a person who is ill, young or old, has, in order to reach the water closet, to pass out into the open air on a cold wet night, from a warm house, is so great that this improvement should be made compulsory. Every water closet should have a window (capable of being opened and shut) in direct communication with the external air.

Washhouses.—Every new house erected for the poorer classes should be provided with a washhouse or washhouses in proportion to the size of the house, fitted up with copper and furnace work, with a supply tap fixed over each copper, and a trapped gulley in the paving for the discharge of waste water.

Drying Yards.—Every new house erected for the poorer classes should be provided either on the, what should be, lead flat of the main roof (protected all round by a high iron railing), or else in the back yard, with drying yards which should be of ample area for the purpose.

Dust Shoots and removal of Dust.—Every new house erected for the poorer classes should be provided with, one on each floor, a dust shoot of sufficient dimensions, and with a hinged flap at the opening. This shoot should discharge into a proper dust-bin, easy of access for emptying, and kept at a safe distance from any window. It should be an order, not to be disobeyed, that these dust-bins be emptied twice in every week on particular days stated, say Wednesdays and Saturdays, and that all dust-carts be covered carts.

Fire Escapes.—Every new house erected for the poorer classes should be provided with an iron ladder, always fixed in its place, and leading from the top floor to a door on to the main roof, which door should be fixed so as to open outwards by the easiest possible contrivances. Then when the lower part of the house is in flames, and escape thence cut off, means are at hand at the top of the house.

Fire Hydrants.—Fire Hydrants should be placed in all positions where they can be used with the greatest facility in checking the spread of fire, and particularly in all courts, yards, and other places difficult of access for the ordinary means of putting out fires.

Playing Yards.—To every new house erected for the poorer classes there should be provided an area of ground open on three, or at least two sides, but covered in at top, and paved with wood paving blocks, as a place of recreation for the poor children of the house, so that, even during wet weather, they may, if they like, escape from the crowded room, and play together in fresh air, under cover, and the more immediate control of the parents. This provision would be useful as an adjunct to any public open space near, and to the open space at the rear of every house, now provided for in the Metropolis Management and Buildings Acts Amendment Act, 1882.

Pavings.—The material employed by the Vestries for paving the footways and carriageways depends somewhat upon new ideas and inventions, and may, therefore, be left to the good judgment of those bodies; but it would be well, if, in frosty weather, the Vestries would exercise a little more intelligence, spread sand and gravel over the principal roadways, and thus prevent many a sad accident to man and horse.

Subways.—It should be made compulsory that in every new street formation, subways be built under the roadway for the reception of sewers, gas, water and other pipes, and telegraph and telephone wires, and the several companies should be not only compelled to lay their mains and wires in such subways but they should be rated for the privilege. At the present time these companies are allowed to render the subways

useless because they will not, on grounds which might be shown to be quite untenable, place their mains in them.

Gullies.—Street gullies should be more particularly looked after. They should always be provided with an ample and well-built brick trap chamber, and the grating over them should be hinged, so as to allow of the clearance of the chamber without disturbing the channel of the roadway. Some of the gulley chambers are so constructed that it is very difficult to thoroughly cleanse them, and I observe, with pleasure, that the Vestry of St. Pancras, in their new gullies, so construct the chamber that it can very readily be emptied and cleansed from the footway near, into which, and over the chambers, proper iron covers have been fitted. All gullies and chambers should be properly cleansed and flushed out with water at least once in each month in the year. Gullies should be fixed nearer to each other than they now are, in many cases the distance apart is so great, and the fall is so insufficient, that water, which should run away quickly into the gullies, remains in the channels.

Cleansing.—The cleansing and slopping of all carriageways should be done every Wednesday and Saturday, and care should be taken that all channels be more particularly scraped and cleansed. The droppings of horses might, as is now the case in some of the principal thoroughfares of the City, be continuously removed from the roadways, and the area of such work might very well be extended to a great many more thoroughfares than now. It would be well, considering how the powers conferred upon the parish officials and police are neglected, that the cleansing of the footways be included in the contract for cleansing the roadways. The cleansing and clearing of the streets from snow, it should be clearly stated in the contracts, and insisted upon, is to be entirely done each and every day immediately following a fall of snow, great or small; there should be no option left to any one, and no possibility of waiting for a thaw, or some other excuse to save the cost of removing the snow, a cost, be it borne in mind, which is generally allowed for in the contract for cleansing.

Watering.—The system of watering the carriageways, as adopted in London, is sometimes provocative of mirth. On a dry dusty day the temper of Londoners is sorely tried by the clouds of dust which are allowed to drift along the highways and byways, penetrating often to one's very skin, and into the houses; while on a wet day, when the dust on the roads has been conveniently and temperately laid by nature's own water carts, out crawl the antique constructions, even now at times to be met with in London, drawn by horses apparently in the last stage of decay, whose harness is only prevented from falling off by pieces of string, the whole concern conducted by poor old men, whose anatomy and clothing appear to have been purposely put together to harmonize with those of the quadrupeds. The small holes in the discharge pipe of the so-called water carts having long ago been stopped up, a continuous stream finds its way in a body out of the ends, as also out of the open joints in the framework of the constructions before referred to, thus pools of water are formed along the roads, and what was a few minutes before a conveniently moist carriage and footway is converted into a muddy swamp. It is true that many of the parishes use hydrostatic

vans, but the discharge pipes in these often allow water to pass out in pools, which should only be emitted in gentle sprays. In my opinion, a far preferable mode of watering most, if not all, of the London carriageways would be by the flexible hose and water jet, which, in Paris, one sees so rapidly move about the roadways, on the carriages, or navigators as they are called. By this system of watering, the jet can be adjusted easily to the requirements of the particular roadway watered, it can be so used that a gentle spray is sent over the surface, and thus the legitimate end, the only end of perfect street watering, viz.: to lay dust and not create puddles, attained. A boon also, in very hot and dusty weather, could be secured by extending the spray over some of the footways, particularly those around our parks. It is, however, very difficult to convince some persons that it is possible to improve upon the old fashioned system of watering roads, as indeed upon anything else. There is a district in London where two or three years ago, the very principle which I have above recommended was put in force. Hydrants were fixed, at convenient distances apart, and the flexible hose and navigators brought into play, the roads were watered so that the dust was completely laid and puddles were absent; but obtuseness in some of the authorities prevailed, and, after one season's trial, the whole thing was allowed to fall into disuse. There is another advantage gained by the use of the flexible hose, and that is, that the water can be directed with force into the channels, as it is in these that accumulation of dust and refuse takes place, which can thus be readily kept down and the channel more easily kept clear.

Lighting.—It is said that the illuminating power in London is equal to 16 candles, and the Metropolitan Board appears to be satisfied that the quality is up to the standard required by Act of Parliament. What sort of candles they may be to which the illuminating power of the gas supplied is equal, I shall not venture to surmise, but I will say that the so-called illuminating power, as supplied to the public lamp posts, is in many instances very falsely so-called. Our public lamp posts are in most cases highly discreditable. A lantern frame, constructed so as to throw a fitful, dim, religious light, in a direction where it is least required, filled in with dirty broken glass, supported by a badly designed, lean and lanky post, which is nearly always out of the vertical, and very often occupying a valuable part of the footway, is practically the order of things in London. If the Metropolitan Board is satisfied with the quality of the gas supplied, the standard required by Act of Parliament must be an exceedingly low one. The gas is very often the reverse of good, and at times that is partly denied us in our own dwellings, by an insufficient supply.

Public Conveniences.—Provision is made in Section 88 of the Metropolis Local Management Act, 1855, empowering the Vestries and District Boards to provide and maintain urinals, waterclosets, and like conveniences. Urinals for men are, it is true, provided, but they are not nearly sufficiently numerous, they are in many instances the reverse of good and suitable construction, and are very often dirty and ill drained. More use should be made of the various glazed building materials now adopted with such excellent effect, and paint should be more frequently applied to prevent that decay which invariably arises in such situations. But where are the "water closets and like con-

conveniences" provided by the Vestries and District Boards? There are only one or two public places of convenience, within my knowledge, where water closets are provided, that next St. Paul's Church, Covent Garden⁶ is by far the best; well-arranged and constructed it is worthy of imitation in all parishes in London. Another convenience for men has just been formed under the surface in front of the Royal Exchange. Most excellently designed, ventilated and carried out, this example shows what can be done below the surface, and will no doubt be followed by many others. I understand that it is already contemplated to form a similar convenience near the Royal Exchange for women, and that one for men and one for women will be formed on either side of the new roadway cut through the triangular piece of ground just cleared at Piccadilly Circus. This is an excellent spot for the purpose, there need be no reason for objection, the conveniences will be underground, and the surface above kept as an open space ornamentally treated. Why also should not w. c.'s similar to those provided for men, be fitted up for the poor girls and women of London? Why should not the poor female, and indeed the middle class female, whose avocation or pleasure causes their absence from home for many hours, have provided for them clean and respectable public conveniences. There are, I believe, one or two in London, and I hope that in addition to the contemplated ones just mentioned, many more will be formed. What I am here advocating is, of course, the gratuitous, in every way, provision of conveniences for poor men and women, erected and maintained at the public expense, but it would, I am sure, be not an unprofitable undertaking if conveniences of a superior character for men and women were provided in proper situations in London, for which a small charge would be made. Visitors to Paris know the advantage of the system there, no shock to modesty is experienced, and the benefits are undeniable.

Lavatories.—Why also should not the benefits and conveniences be extended to the provision of lavatories, to be fitted up in similar public places? The construction might be strong and simple, the service and wastes so arranged that little damage could arise. Soap is cheap, and all that would be wanted would be an attendant to keep order. How sad it is to see, as I have seen many a time, at the drinking fountains in Endell Street and Gray's Inn Road, poor boys, girls, women and men, making themselves as clean as they can, without the aid of soap, at these fountains, which are only constructed for drinking purposes, and go away refreshed, to dry their hands and faces on the piece of rag which may be nearest at hand; surely our outcasts should be as clean as they will make themselves! a cart in a mews, or a dark doorway, has been their place of nocturnal repose, and we might, at least, provide them the wherewithal for their early morning ablution.

Laundries.—Public Laundries should be provided to satisfy the wants of each locality, the prices for using them being so low as to be within the reach of all. Thus a

⁶ The construction of these conveniences formed part of the general scheme of Improvements at St. Paul's Church and in Covent Garden, and they were made at the sole cost of the present Duke of Bedford, the outlay for the conveniences alone amounting to nearly £5000. When completed the Local Board was prevailed upon, after some hesitation, to take the management of them, and the place is now said to be a source of profit to the authorities.—W. W.

poor person who has not the accommodation at home (not living in one of those dwellings for the poorer classes, in which I have previously said washhouses should be provided) may easily, and in a cleanly manner, wash-linen, and another item would be added to the list of healthy and clean provisions in London.

Telephone and Telegraph Wires.—The whole of the overhead telephone and telegraph wires now disfiguring the Metropolis, as well as endangering the lives and property of its inhabitants, should be at once taken down and laid as previously recommended in subways specially provided for them. I am quite aware how difficult and expensive an operation this would be, but the increase of wires during the last few years is enormous, and unless overhead wires are prohibited at once, and the present ones taken down, London will be made quite hideous and dangerous by the wires crossing and recrossing each other over the houses, disfiguring the skyline of many of them, and injuring the roofs and chimney stacks of most of them, which are in many cases in risk of collapse by reason of the iron stays, upon which there is considerable pressure, being tied down to them. I have before said that the Companies should be rated for the use of the subways.

Hoads.—At the present moment hoards are erected around building works to protect the public from injury during the operations. They are set up subject to the conditions of licenses issued by the parish authorities, but according to the decision of the late Lord Chief Justice Cockburn, builders may do pretty well what they like with the hoards. If a Vestry should happen to attempt to restrict the use of the hoard to the one purpose for which it is set up, viz.: the protection of the public, the builder may laugh the Vestry to scorn, and should the Vestry decline to grant or renew the license, he may proceed to set up his hoard, and to keep it where set up, until it suits his convenience to remove it. It is true that the terms of the license would appear to be sufficiently stringent to regulate the builder, but as a matter of fact, bearing in mind the decision of Lord Chief Justice Cockburn, they are not sufficiently so, and another Act of Parliament would be required to make them so. An instance of this came within my experience last year where, on land in Coventry Street, let, bear in mind, by the Metropolitan Board itself, a builder was allowed to bring out his hoard, and to keep it there for months, to a most unnecessary projection into the public way, and to carry it up to a most unnecessary height, thereby interfering with the traffic, and injuriously affecting the business of a tradesman whose premises adjoined the hoarding—and why? Because the builder was obtaining all that time the advantages arising from the conversion of a hoard, which should only have been 8 feet high, and for the protection of the public, into a huge advertising station. I used every endeavour with architect, builder, and vestry surveyor, but the two former would not, and the latter could not, compel the lowering and setting back of the hoarding, so the public and the tradesman had to suffer, until the very exigencies of the completion of the building itself rendered the removal of the hoard desirable. I quite think, therefore, that a new Act of Parliament should be passed, conferring absolute power on the Vestries or other local authorities as regards the erection of hoards and enclosures of a like nature.

Mortuaries.—The mortuaries and dead houses, as they now exist, are chiefly for the

reception of suicides, persons accidentally killed, for other special cases, and post mortem examinations. These "dead houses", as they were called, were, and are, in some cases, little more than dark, dirty, horrible holes. A few, however, of the parishes have built new mortuaries, as far as possible perfect, and with every regard paid to decency and sanitary completeness. I think that the erection of new, spacious, well-designed buildings, are now needed, in which, without distress to the loving hearts of relatives, dead bodies might be taken from the crowded home, and deposited in these mortuaries until the day of burial, when the body might be either taken direct to the cemetery or to the home, as the relatives might most desire. I would have these mortuaries designed to provide separate and distinct compartments for each body, and of sufficient size to admit

the presence of three or four relatives; each compartment well-lighted and ventilated, and provided with a door with lock and keys, one key in charge of the mortuary superintendent, the other in the charge of the nearest relative. The partitions of the compartments need only be 8 feet high, and the general height of the mortuary being, say 16 feet, a space of 8 feet would be left all over, by which means thorough ventilation of each compartment would be secured. The material of these mortuaries, inside, should be chiefly of the glazed hardware description, woodwork being as little used as possible, and the design of the exterior should be consistently cheerful, not of that repellant nature which would lead sensitive and broken-hearted relatives to

prefer the stifled home to the better ventilated mortuary, but with the unhappy words "workhouse" and "charity" ingrained on the surface of its very architecture.

Public Swimming Baths and Gymnasia.—
In every well-regulated city, in every community which keeps constantly before its eyes the fact that the lowering of the death rate, and the hardy, robust, sound, and healthy existence of the population are subjects of the very greatest importance, due provision would be made for setting up in convenient parts of the city public gymnasia, and public swimming baths. I am aware that in some way or other the latter provision is partly met, but very inadequately, and at a price which renders it inoperative to those

most in need of it. The public baths which I should like to see set up would be of the plainest and most inexpensive character, large basins lightly roofed in, the cost defrayed by the city, and the charge for admission nothing. The Metropolitan Garden Association is already doing much good in providing gratuitous gymnasia for the poor children of London.

Public Libraries and Technical Schools:— The Public Libraries Acts are not sufficiently borne in mind. Advantage could be taken of them more frequently than is now the case, and although the Schools of Art and the one or two technical schools throughout the kingdom are doing, and have done, much good, the technical schools for

men engaged in the building trade are lamentably deficient. We want for these men not so much the teaching of fine drawing and beautiful shading, as we do modelling classes, such as they have in Paris, where the young workman models a winding staircase, a niche, a roof, a piece of groining, in fact, on a small scale, does that in the school, which, to-morrow, he will be called upon to do in the building.

His executions of models of the various parts of his trade tells him exactly where he is weak, tells him in an hour how to set out an intricate piece of work which he would not learn, and then not so well, from drawings in a month. These buildings need not be costly, but simple, plain workshops.

kept up by the State for the benefit of itself.

Open Spaces.

Perhaps at no period of our history has the question of open spaces been so persistently kept before the public as at the present time, and when we bear in mind that every available foot of open space is being gradually but surely covered with bricks and mortar, not only in the centre of our Metropolis, but also in the immediately out-lying suburbs, it behoves those who have regard for the physique of our growing population, and for the comfortable well-being of those destined to permanently reside in London, to keep a very sharp look out on the encroachments, and to use their utmost endeavours

to prevent that which, once lost, is for ever gone. Unfortunately, however, this question of open spaces, especially those for the health and recreation of the people, has hitherto been regarded as every-body's business with the result, ^{as usual} that, with few exceptions, it has resolved itself into nobody's business. Many open spaces, which not so very long ago threw over central London the balmy breeze, and the sweet scent of ~~the~~ new mown hay, have been supplanted by the compact, closely shut in, and smoke issuing venture of the speculating builder.

Look at Horwood's map, showing London as it existed at the early part of this century even. What has become of Moorfields and the locality to the north of London wall?

blerkenwell and all the district north of the City Road? Chelsea and its neighbourhood? Bow, Mile End, and thereabouts?

Lisson Green and all beyond to the north? Islington Fields? and many another good field? Then go to the immediately outlying suburbs and compare the map of 30 or 40 years ago with that of to-day. Mr. Edward I'Anson, the other evening at the Surveyors' Institution, gave a most interesting but alarming account of what he himself remembers, in the neighbourhood of Blapham Common, of the great encroachments on open spaces, and it certainly obtains with greater force in the north and north-west of London.

What controlling power has attempted to step in and stop this cruel occupation of open space? It is true that the Metropolitan Board of Works and the Corporation of the City of London have, at great cost, secured for ever spaces of the greatest value in and around London, but that has not been done before the outcry for their acquisition has been irresistible, and the outcry must be equally irresistible if the grand addition to Hampstead Heath, namely Parliament Hill, is to be secured as ground for the health and recreation of the people, and for the view of landscape unequalled in the suburbs of this Metropolis. The Metropolitan

Garden Association, of which Lord
Brabazon is chairman, has done
wonders already for Londoners in
the opening up and beautifying of
squares, of disused burial grounds,
and of any other bits of open space
which had become pestilential holes,
highly dangerous to the health of the
surroundings, and a disgrace to the
constituted authorities who permitted
them to become so. But that has been
done at the expense and gratuitous
expenditure of time and trouble of an
Association of

benevolent ladies and gentlemen! Much more, too, has this Association accomplished for the poor children of the Metropolis, and I recommend all those desirous of helping in the good work to obtain a little book issued by the Association, wherein they will find a full account of the noble work accomplished.

I will now consider the question with reference to open spaces in connection with buildings, that is to say, the part of the building ground reserved for access, light and air, and perhaps garden ground and forecourt, necessary for the healthy occupation of the dwelling. The Metropolis Management and Building Acts (Amendment) Act, 1882, provides for open spaces to be left at the rear of all new buildings intended to be used wholly or in part as dwelling-houses when such are to be erected upon a site not previously occupied in whole or in part by a building. Now, as in London, there is hardly a spot which has not been previously occupied in whole or in part by a building, the exception is quite sufficient to warrant the assertion that the enactment might just as well have been omitted from the statute book. Open spaces in front of buildings might very often be easily secured with advantage to the public if the Metropolitan Board of Works only kept itself alive to the powers it possesses over lines of building frontage. When large rebuilding works are contemplated it should demand at least the setting back to secure the prescribed widths of thoroughfare, so that as building after building is pulled down the new might keep to the widened line, but the condition into which Chancery Lane, the thoroughfares out of Coventry Street, and numerous other examples have been allowed to fall, is very clear evidence that proper supervision is not secured in such matters, and that golden opportunities are allowed to slide away never to be regained. But even in places where provision was made for open space and good width of thoroughfare, the apathy, or worse, of those whose duty it was to maintain compliance with the intentions clearly laid down, has permitted the incursion of bricks and mortar on land intended to be kept as open space. Take two examples:—In the reign of Charles the Second an Act was passed containing the following clause:—"There shall be left a continued tract of ground all along from London Bridge "to the Temple, of the breadth of forty feet of assize, from the north side of the river "Thames to be converted to a key or public and open wharf," and to ensure this, due provision was made for the removal of all buildings which stood in the way of the open space. Upon a survey which, by Royal command, Sir Christopher Wren made on January 25th, 1670, he reports the various obstructions and erections then existing on this forty feet quay, and after many and repeated complaints of encroachments, we find that on July 10th, 1821, an Act passed both Houses to repeal so much of the Act of Charles the Second as restrained the erections on the quay, the great mover in securing the passing of the Act of 1821 being Mr. Charles Calvert, a partner in the firm whose obstructions and erections on the quay had formed the ground of complaint. Then there is the case of the Euston Road, referred to in the discussion which took place on Mr. Westgarth's paper on London, read at the Society of Arts, on February 6th, 1884. This road is part of the "New Road," which was formed from Paddington to Islington in 1757, under the powers of an Act of Parliament, 29th George the Second,

cap. 88. By this Act the erection of buildings within 50 feet of the margin of the road was prohibited, and the parochial authorities were empowered, upon obtaining an order from a magistrate, to pull down and remove any such erection as a common nuisance. Now, had this wise prohibition been maintained, had the forethought of the Legislature been respected by those appointed to carry it into execution, we should have had a splendid boulevard as a fitting approach to the heart of the Metropolis; the residents would have had the pleasant front gardens which were laid out for their enjoyment when the road was first formed, and the surrounding inhabitants would have reaped all the benefits of healthy open space. But because, by inexplicable carelessness, or worse, the parochial authorities have neglected their duty, we have in place of all which would have been pleasant, the unpleasant, unsightly, and disgraceful encroachments on to the very edge of the footway, which now distinguish the Euston Road, as they do also the Hackney Road, and other roads which perhaps were formed under similar wise conditions to those of the "New Road." It would really appear to have been reserved for the advanced intelligence of the latter part of the nineteenth century to use every means which the sacredness of private property, and the laches of constituted authority permit, to cover by buildings every foot of available land, reserving only for open space just sufficient for the due, or partial, lighting of the buildings erected. To expect that a private landlord, or a Metropolitan Board of Works, or a City Corporation, would sacrifice so much per foot superficial of ground rent, in order to provide ample and healthy breathing space, is to betray a lamentable ignorance of their commercial instincts, and I take leave to assert that the greed of the ground landlords will presently bring about startling alterations in land lettings, in the prices paid for the portions of the land which cannot be built upon, and in the disposition of the buildings upon the sites let.

In a note which appeared in *The Times* (I think) last year, it was stated that a recent calculation showed that:—Paris has 172,000 acres in parks, or one acre to every 13 inhabitants; Vienna has one to every 100; Chicago one to every 200; Philadelphia one to every 300; Brooklyn one to every 639; New York one to every 1363, but it is stated that New York proposes to buy 3808 acres for additional parks, at an estimated cost of 2000 dollars per acre, or, in the aggregate, an expenditure of 7,616,000 dollars.

Of parks and other open spaces in what is termed "Greater London" the following are, approximately, the areas:—

	<i>Acres.</i>		<i>Acres.</i>
Hampstead Heath ...	240	Paddington Green ...	1
Finsbury Park ...	115	Battersea Park ...	250
Stoke Newington Common ...	5½	Southwark Park ...	63
Victoria Park ...	300	Kennington Park ...	25
Regent's Park and Primrose Hill	450	Thames Embankment Gardens ...	14
St. James's Park ...	83	The London Squares ...	150
The Green Park ...	71	London Fields ...	27
Hyde Park ...	400	South Hackney Common ...	5½
Kensington Gardens ...	300	Hackney Downs ...	50

<i>Acres.</i>			<i>Acres.</i>		
Hackney Marshes	...	345	Plumstead Common	...	100
Clapton Common	...	9 $\frac{1}{4}$	Shoulder of Mutton Green	...	4
North Mill Field	...	29	Tooting Beck Common	...	144
South Mill Field	...	28	Tooting Graveney Common	...	63
Clapham Common	...	220	Barnes Common	...	100
Wandsworth Common...	...	183	Well Street Common	...	30
Streatham, Upper and Lower } Commons ...	...	66	Kew Gardens	...	300
Brook Green...	...	6	Richmond Park	...	2250
Eelbrook Common	...	12	Bushey Park...	...	1000
Parson's Green	...	3	Wimbledon Common and Putney } Heath	...	1000
Goose Green...	...	6 $\frac{1}{2}$	Wormwood Scrubs	...	194
Camberwell Green	...	2 $\frac{1}{2}$	Blackheath	...	267
West Ham Park	...	80	Nunhead Green	...	1 $\frac{1}{2}$
Peckham Rye	...	64	Epping Forest	...	5348
Shepherd's Bush Common	...	8	Wanstead Park	...	182
Bostall Heath	...	55	Greenwich Park	...	200
			<hr/> 14,851 <hr/>		

This gives a total of 14,851 acres, and if we add to it say 500 acres for places not mentioned in the above list, we arrive at the grand total of 15,351 acres of parks and recreation grounds in "Greater London."

Greater London had, last year, an estimated population of 5,093,995, and the parks, &c., mentioned being 15,351 acres, gives one acre to every 332 persons (nearly). This compares very unfavourably with Paris, which has one acre to every 13 inhabitants, and with Vienna, which has one to every 100 inhabitants; but it is still more unfavourable when we consider that the inner ring of London, with its estimated population last year of 4,019,000, has certainly not more than 4,000 acres of open spaces, including the squares. Thus, where the population is thickest, where the streets are narrow and confined, where courts and alleys abound, there is only one acre of real open space to every 1,000 inhabitants, a state of things which is only worse in New York, where the authorities are, as I have said, endeavouring to buy nearly 4,000 acres of land for additional parks.

I have indicated the extent of the powers⁷ possessed by the Government of London to provide for the healthy existence of its inhabitants; some reasons why those powers are inadequately met; and some additional provisions which should, in my opinion, be made to make them more complete. I will now briefly, in conclusion, suggest a few points which might ensure a more systematic observance of Acts of Parliament.

⁷ I find that I have omitted to refer to a recent Act which concerns the subject of this Paper, namely, "Disused Burial Grounds Act, 1884."—W. W.

The whole of the present Acts affecting London should be repealed, and one new Act framed, embodying the present and all additional clauses required to make it complete.

A copious Index should accompany the volume, for easy reference.

For the guidance of officials, a careful record should be kept of all disputed cases.

A Plan of London should be made, showing small subdivisions clearly marked for reference; each division or district should have its own responsible surveyor and under officials, so that, in the event of any question arising, it may be seen at a glance which officer is required for any particular street or place mentioned.

A Department of Works should be created, with an acting, responsible, and permanent Minister at its head; and under him two permanent, acting, responsible Under-Secretaries, with an adequate staff under them. In this department should be provided an efficient and sufficient staff of architects, to whom should be referred all questions of rebuilding, and who should be provided with a well-considered plan of London, showing all the improved lines of communication needed, to which all rebuilding works should be directed, with a view to the ultimate carrying-out of that improved plan.

A staff of well-qualified surveyors should be employed, at such salaries as would command good men. These surveyors should have power to enforce the minor provisions of the Act, which provisions should be specially set out therein as to be dealt with by the surveyors; but the more important provisions should be enforced only after consultation with the Under-Secretaries or the Minister.

A staff of efficient sanitary inspectors should be appointed, acting under the orders and guidance of the surveyors. The duty of these inspectors should be carefully set out in printed particulars, and they should be furnished with printed forms to fill and hand to the surveyors, in all cases where action is needed.

Yards should be provided at different parts of the Metropolis, containing all the necessary materials, appliances, and workmen for carrying out the requisitions of the Department of Works, in the event of the neglect of the persons served with notice so to comply with them.

Such additional provisions and emendations should be made in the Act from time to time, as experience of its working proved to be necessary.

But how can this be accomplished? My answer shall be by adopting the invocation of Voltaire when, in 1749, in an article entitled "*Des Embellissements de Paris*," he uttered words not inapplicable, even now, to the London of our own time. "May heaven send," said he, "some Man, some Statesman, sufficiently zealous to undertake such projects, with "a mind sufficiently firm and enlightened to carry them out, and that he may have trust "enough reposed in him to make them a success! If, in our immense city, no one can "be found to do this, if we are contented to talk of it at table, to utter useless vows, or, "may be, impertinent pleasantries, *il faut pleurer sur les ruines de Jerusalem*."⁸

WM. WOODWARD.

⁸ A report in full of the Discussion which followed the reading of the foregoing Paper is printed in the Journal of PROCEEDINGS, Vol. II., New Series, pp. 49-58, issued to Members on the 19th November 1885.

Some Acts of Parliament passed during the present century for the government of London

[most of which are mentioned in the foregoing Paper.]

53 George III c. 62 - An Act for paving and otherwise improving certain Streets and other Public Passages and Places which are or shall be made upon certain Pieces of ground belonging to His Majesty, in the several parishes of Saint Mary-le-bone and Saint Pancras, in the County of Middlesex, called Mary-le-bone Park. [1st May 1813]

53 George III c. 121. - An Act for making a more convenient communication from Mary-le-bone Park and the Northern Parts of the Metropolis, in the Parish of Saint Mary-le-bone, to Charing Cross within the Liberty of Westminster; and for making a more convenient Sewage for the same [10th July 1813]

56 George III c. 128. - An act to amend Two Acts made in the Fifty-third Year of the Reign of his present Majesty

esty, for opening a more convenient communication from Mary-le-bone Park to Charing Cross, and for paving the Streets to be made in Mary-le-bone Park; and to enable his Majesty to grant small Portions of Land as Sites for Public Buildings, or to be used as Cemeteries within the Bills of Mortality [1st July 1816]

54 George III c. 29. - An Act for better paving, improving and regulating the Streets of the Metropolis, and removing and preventing nuisances and obstructions therein. [16th June 1817]

5 George IV c. 100. - An Act for more effectually paving, lighting, watching, cleansing, and regulating the Regent's Park, together with the New Street from the Regent's Park to Pall Mall, and the New Streets and Improvements in the Neighbourhood of Parliament Street and Privy Gardens; and for maintaining a convenient Sewage for the same. [21st June 1824]

6 George IV c. 38. - An Act for extending the Jurisdiction of the Commissioners acting in Execution

of an Act of the Fifth Year of His present Majesty,
for having and regulating the Regent's Park,
together with the New Street from thence to Pall Mall;
and for other purposes relating thereto. [10th June 1825]

7 George IV c. 77.— An Act to extend to Charing Cross,
the Strand, and Places adjacent, the Powers of an
Act for making a more convenient communication
from Mary-le-bone Park; and to enable the Commis-
sioners of His Majesty's Woods, Forests, and Land
Revenues to grant Leases of the Site of Carlton Palace

[31st May 1826]

7 & 8 George IV c. 66.— An Act to extend an Act of
the Fifty-sixth Year of His late Majesty, for enabling
His Majesty to grant small Portions of Land as
Sites for Public Buildings, or to be used as Cemeteries.

[2nd July 1827.]

9. George IV c. 64.— An Act to extend the Jurisdiction
of the Commissioners acting in the Execution of Two
Acts for having and regulating the Regent's Park,

together with the New Street from thence to Pall Mall; and to amend the said acts [15th July 1828]

9. George IV. c. 70. — An Act to alter and enlarge the Powers of an Act passed in the Seventh Year of the Reign of His present Majesty, for extending to Charing Cross, the Strand, and Places adjacent, the Powers of an Act for making a more convenient communication from Mary-le-bone Park, and for enabling the Commissioners of His Majesty's Woods, Forests, and Land Revenues to grant leases of the Site of Carlton Palace; and for other Purposes relating thereto. [19th July 1828]

10 George IV c. 61. — An Act to amend an Act of the Seventh Year of His present Majesty, for extending to Charing Cross, the Strand, and Places adjacent, the Powers of an Act for making a more convenient communication from Mary-le-bone Park.

[24th June 1829]

1 & 2 William IV. c. 29. — An Act to authorise and empower the Commissioners appointed by an Act of the Seventh Year of His late Majesty King George the Fourth, for extending to Charing Cross, the Strand, and Places adjacent, the Powers of an Act for making a more convenient Communication from Mary-le-bone Park, to make and form a new Street from the Strand to Charles Street, Covent Garden, and to widen the North End of Bow Street into Long Acre; and for other Purposes.

[27th Sept^r 1831.]

2 William IV c. 56. — An Act to extend the Jurisdiction of the Commissioners acting in the Execution of Three Acts for paving and regulating the Regents Park, and several Streets and Places in Westminster, to certain other Streets & Places in Westminster; and for other Purposes.

[23rd June 1832]

2 + 3 Vict. c. 44. - An Act for further improving the Police in and near the Metropolis.

[17th August 1839.]

2 + 3 Vict. c. 41. - An Act for regulating the Police courts in the Metropolis.

[24th Aug. 1839.]

6 + 7. Vict. c. 36. - An Act to exempt from bounty, Borough, Parochial, and other local Rates, Land and Buildings occupied by Scientific or Literary Societies.

[28th July 1843.]

8. Vict. c. 18. - An Act for consolidating in one Act certain Provisions usually inserted in Acts authorising the taking of Lands for Undertakings of a public nature.

[8th May 1845.]

11 + 12. Vict. c. 50. - An Act to empower the Commissioners of Her Majesty's Woods to remove the Colonnade in the Regent's

Quadrant.

[14th Aug 1848]

11 & 12. Vict. c. 163. - An Act to provide for the Sanatory Improvement of the City of London and the Liberties thereof, and for the better cleansing, sewerage, paving, and lighting the same.

[5th September 1848.]

14 & 15 Vict. c. 91. - An Act to continue "The City of London Sewers Act, 1848" and to alter and amend the Provisions of the said Act

[24th July 1851.]

14 & 15. Vict. c. 95. - An Act for transferring the Duties of paving, lighting, watering, and cleansing Parts of the Crown Estate in the District of the Regent's Park and certain Streets and Places in Westminster from the Commissioners acting under several Acts of Their late Majesties King George the Fourth and King William

the Fourth to the Parishes; and for transferring the Jurisdiction of the said Commissioners over certain other places in Westminster to the Commissioners of Her Majesty's Works and Public Buildings; and for other purposes. . . [7th August 1851.]

15 & 16 Vict. c. 84. — An Act to make better provision respecting the Supply of Water to the Metropolis. [1st July 1852.]

16 & 17. Vict. c. 40. — An Act for altering the Mode of Repayment of Advances by the Public Works Loan Commissioners under the Public Health Act, 1848, and other acts. [8th July 1853.]

18 & 19 Vict. c. 70. — An Act for further promoting the Establishment of Free Public Libraries and Museums in Municipal Towns, and for extending it to Towns governed under Local Improve-

ment Acts and to Parishes.

[30th July 1855.]

18 + 19 Vict c. 116. - An Act for the better Prevention of Diseases. [14th August 1855.]

18 + 19 Vict. c. 120. - An Act for the better local Managment of the Metropolis.

[14th Aug^e 1855]

18 + 19. Vict. c. 121. - An Act to consolidate and amend the Nuisances Removal and Diseases Prevention Acts, 1848 and 1849.

[14th Aug^e 1855]

18 + 19. Vict. c. 122. - An Act to amend the Laws relating to the Construction of Buildings in the Metropolis and its Neighbourhood.

[14th Aug^e 1855]

19 + 20 Vict. c. 112. - An Act to amend the Act for "the better local Management of the Metropolis, 1855." [29th July 1856]

23 + 24 Vict. c. 30. - An Act to enable a

Majority of Two Thirds of the Ratepayers of any Parish or District, duly assembled, to rate their District in aid of Public Improvements for general Benefit within their

District.

[3rd July 1860]

23 & 24 Vict. c. 52. - An Act to alter and amend "the Metropolitan Building Act 1855

[23rd of July 1860.]

23 & 24 Vict. c. 47. - An Act to amend the Acts for the removal of Nuisances and the Prevention of Diseases. [6th August 1860.]

23 & 24 Vict. c. 106. - An Act to amend the Lands clauses Consolidation Acts (1845) in regard to Sales and Compensation for Land by way of a Rentcharge, Annual Ten Duty or Ground Annual, and to enable Her Majesty's Principal Secretary of State for the War Department to avail himself of the Powers and Provisions contained

in the same Acts. [20th August 1860.]

23 + 24. Vict. c. 125. - An Act for better regulating the Supply of Gas to the Metropolis. [28th August 1860.]

24 + 25. Vict. c. 42. - An Act to continue the duties levied on coal and wine by the Corporation of London.

[22nd July 1861.]

24 + 25. Vict. c. 87. - An Act to amend the Metropolitan Building Act, 1855.

[6th August 1861.]

25 + 26 Vict. c. 102. - An Act to amend the Metropolis local Management Acts.

[7th August 1862.]

26 Vict. c. 13. - An Act for the protection of certain garden or ornamental grounds in cities and boroughs. [4th May 1863.]

28 + 29. Vict. c. 90. - An Act for the Establishment of a Fire Brigade within the

Metropolis.

[5th July 1865.]

29 + 30 Vict. c. 90. - An Act to amend the Law relating to the Public Health.

[7th August 1866.]

29 + 30 Vict. c. 114. - An Act to amend the Public Libraries Act.

[10th August 1866.]

31. Vict. c. 17. - An Act to further continue and appropriate the London Coal and Wine duties. [29th May 1868.]

31 + 32 Vict. c. 80. - An Act to make Provision respecting the Use of Subways constructed by the Metropolitan Board of Works in the Metropolis.

[25th June 1868.]

31 + 32 Vict. c. 115. - An Act to amend the Sanitary Act. 1866. [31st July 1868.]

31 + 32 Vict. c. 130. - An Act to provide better dwellings for artisans and

Labourers.

[31st July 1868.]

32 + 33 Vict. c. 18. — An Act to amend the Lands clauses consolidation Act.

[24th June 1869.]

32 + 33 Vict. c. 67. — An Act to provide for Uniformity in the Assessment of Rateable Property in the Metropolis.

[9th August 1869.]

32 + 33 Vict. c. 82. — An Act to amend the Metropolitan Building Act 1855.

[9th August 1869.]

32 + 33. Vict. c. 102. — An Act for making further provision respecting the borrowing of money by the Metropolitan Board of Works and for other purposes connected therewith.

[9th August 1869.]

34 + 35. Vict. c. 71. — An Act to amend the Public Libraries Act, 1855.

[14th August 1871.]

34 + 35 Vict. c. 113. - An Act to amend
"The Metropolis Water Act, 1852;" and
to make further provision for the due
Supply of Water to the Metropolis and
certain places in the neighbourhood
thereof. [21st August 1871.]

* * * "Regulations under the "Metropolis
* Water Act 1871," were made at the
Council Chamber, Whitehall, the 10th day
of August 1872, and the same were
printed in an official form.

35 + 36 Vict. c. 15 - An Act for the reg-
ulations of the Royal Parks and Gardens.

[27th of June 1872]

36 + 37 Vict. c. 100. - An Act for making
a new Street from Charing Cross to the
Victoria Embankment. [7th July 1873.]

37 + 38. Vict. c. 67. - An Act to regulate
and otherwise deal with Slaughter -

houses and certain other businesses in the
Metropolis. — [7th August 1874.]

37 + 38 Vict. c. 89. — An Act to amend
and extend the Sanitary Laws.

[7th August 1874.]

38 + 39. Vict. c. 33. — An Act to amend
the Metropolis Management Acts.

[29th June 1875.]

38 + 39 Vict. c. 36. — An Act for facil-
itating the Improvement of the Dwellings
of the Working classes in large towns.

[29th June 1875.]

38 + 39. Vict. c. 55. — An Act for con-
solidating and amending the Acts
relating to Public Health in England.

[11th August 1875.]

38 + 39 Vict. c. 89. — An Act to consol-
idate with

Amendments the Acts relating to Loans for Public Works.

39 & 40 VICT. c. 31.—An Act to grant Money for the purpose of Loans by the Public Works Loan Commissioners, and to amend the Public Works Loans Act, 1875. [24th July 1876.]

40 & 41 VICT. c. 35.—An Act for affording Facilities for the Enjoyment by the Public of Open Spaces in the Metropolis. [2nd August 1877.]

40 & 41 VICT. c. 54.—An Act to amend the Public Libraries Acts. [14th August 1877.]

40 & 41 VICT. c. 235.—An Act for enabling the Metropolitan Board of Works to make certain New Streets and Street Improvements within the Metropolis. [14th August 1877.]

41 & 42 VICT. c. 32.—An Act to amend the Metropolis Management Act, 1855, the Metropolitan Building Act, 1855, and the Acts amending the same respectively. [22nd July 1878.]

* * By-laws were made, under the provisions of this Act, by the Metropolitan Board of Works, in October 1879, and additional By-laws, just made by the Board, await confirmation by the Secretary of State.

42 & 43 VICT. c. 63.—An Act to amend the Artizans and Labourers Dwellings Improvement Act, 1875. [15th August 1879.]

42 & 43 VICT. c. 64.—An Act to extend the powers of the Artizans Dwellings Act of 1868, by

provisions for compensation and rebuilding.

42 & 43 VICT. c. 198.—An Act to amend the Metropolis Management Act, 1855, and the Acts amending the same, so far as relates to the protection of the Metropolis from floods and inundations caused by the overflow of the River Thames; and for other purposes. [15th August 1879.]

44 & 45 VICT. c. 34.—An Act to amend the Metropolitan Open Spaces Act, 1877. [11th August 1879.]

45 VICT. c. 14.—An Act to confer further powers upon the Metropolitan Board of Works with respect to Streets and Buildings in the Metropolis. [11th August 1881.]

45 & 46 VICT. c. 54.—An Act to amend the Artizans and Labourers Dwellings Acts. [19th June 1882.]

45 & 46 VICT. c. 222.—An Act for amending the Metropolitan Street Improvements Act, 1877. [18th August 1882.]

46 VICT. c. 15.—An Act to amend the Lands Clauses Consolidation Act, 1845. [18th June 1883.]

47 & 48 VICT. c. 72.—An Act for preventing the erection of Buildings on Disused Burial Grounds. [14th August 1884.]

48 & 49 VICT. c. 72.—An Act to amend the Law relating to Dwellings of the Working Classes. [14th August 1885.]

The object of inserting the foregoing list is to direct attention to the numerous Acts which have been passed for the government of London; and although the provisions of some of them have been rendered obsolete by the completion of the works cited, the perusal of all will benefit every Administrative Officer, and indeed every Vestryman, desirous of making himself familiar with the duties he may be called upon to fulfil.

WM. WOODWARD.

XIV.

WISBY IN THE ISLAND OF GOTLAND.

By WILLIAM WHITE, F.S.A., *Fellow*.

[Read on Monday, 14th December 1885, Ewan Christian, *President*, in the Chair.]

MY VISIT to Wisby was a surprise to myself, for I had no idea of finding in Gothland, or Gotland as it is more correctly called, a field especially suitable for the study of Gothic architecture; or, indeed, of finding in any part of Sweden so many mediæval remains, and of so interesting a description, as are here to be seen. The island, as you probably know, is some twelve or fourteen hours by steamer from Stockholm, and south-east of Sweden proper. It is eighty miles in length, and twenty-five miles in breadth. It is studded with numerous villages. But in Wisby alone (or Veesbie as it is pronounced in Sweden), the capital of Gotland, I found quite enough to interest and to occupy me without stirring outside the town.

The general appearance of Wisby is remarkably quaint and picturesque, rising as it does on a steep slope from the sea, facing north-west. It is surrounded by a continuous stone wall, the line of which is broken by bastions and gateway-towers at short intervals, except on the side towards the sea. Here there are none. There is little about the construction or detail of the walls to denote their date. They are said to have been built at the end of the 13th century upon the site of still earlier walls. It is certain that considerable portions give evidence of their having been thickened and raised at some period subsequent to their first erection. They are upon the whole in a wonderful state of completeness and preservation, considering the roughness of their construction in many parts. The walls will not compare, perhaps, in magnitude or in character with those of ancient Chester or Avignon; but the whole place is remarkably compact and complete. There was no passage-way left along the top of the wall behind a parapet, as in those places, but a projecting wooden gallery was hung out on the inside of the wall, for communication and for defensive purposes [Illustrn. viii]. The towers are square in form, but enclosed only on three sides. The side towards the town was open. It has been in some cases enclosed for the formation of a storehouse or other purpose. Several are called "Saddle towers," being corbelled out upon the wall equally on each side.

The town contains now but about 4,000 inhabitants. Its population in mediæval times numbered, perhaps, 15 or 20 thousand. Its situation made it favourable for becoming one of the chief Scandinavian ports of the Hanseatic League, by whose wealthy merchants, no doubt, some of the churches were reconstructed and others built; for, apart from the different conventual orders, there was a remarkable variety of nationality represented. There were special churches of the Germans, of the Russians, and so forth. Wisby was conquered by the Danes in 1361; but as regards the dates generally given for the various buildings, I ought to say there is but little reliance to be placed in them. There is now a singular sense of pervading quiet and desertion in the irregular, narrow, roughly paved streets, except on the arrival and departure of the steamboat. The chief signs of life and activity are to be found in the large Pavilion, which forms the centre of attraction in the Botanical Gardens, where, in summer at any rate, some hundreds of inhabitants and visitors take their daily meals, enlivened by an excellent band of music. My chief interest at Wisby, of course, was in the churches, of which only ten now remain, all in ruins, with the exception of that of St. Mary, which still continues to serve as the cathedral church.

My sketch plans and elevations were laid down to a small scale. Excepting for details the dimensions were but roughly taken; and, although they prove to be fairly accurate, I am glad to be able to give the more accurate measurements made by Sir Henry Dryden, eight years ago, as well as to make use, for the purposes of this Paper, of some of his own bold, clear and characteristic drawings, which he has kindly lent me. The churches were planned on a somewhat imposing scale, all but three being from 56 feet up to 99 feet in breadth, clear inside measure [Illustn. ix].

			<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>
1. St. Mary (Cathedral) ...	...	...	171	6 long by	99	0 wide.
2. St. Nicholas ...	...	...	195	3 „	64	9 „
3. St. Gertrude ...	...	...	61	1 „	19	0 „
4. Church of the Holy Ghost (<i>Helge- And's kyrkan</i>) ...	...	...	83	0 „	47	7 „
5. St. Klemens ...	...	...	145	9 „	72	3 „
6. St. Olof ...	...	length unknown			46	0 „
7. St. Drotten ...	...	...	118	0 „	67	4 „
8. St. Lars ...	...	...	104	0 „	77	7 „
9. St. Katherine ...	...	...	199	1 „	56	4 „
10. St. Hans, of which I have no dimensions, except of the span of nave						43 feet.
11. St. Göran or St. George ...	...	...	124	0 long by	36	0 wide.

Besides these there were other churches of which all remains have disappeared, and almost the only reminiscence of their locality consists in the streets or houses to which they have bequeathed their names. Of these St. Peter's is said to have been the oldest in the town and most important. Then there were the churches of St. James, St. Michael and several others, six altogether.

1. The old and still used Cathedral Church of St. Mary was the church of the

Germans, built by merchants of Lubeck [Illustn. x]. Its interior effect can hardly be called interesting or attractive. A prevailing coat of whitewash covers the stonework of the massive shafted Romanesque pillars and arches, and simple quadripartite vaulting. It is fitted with cumbrous pews and doors with large locks, which apparently are not much in use now. The centre passage is crowded with forms without backs, but with kneeling boards attached. The passages are well-filled with large monumental slabs. The pulpit is very spacious, and has an elaborate staircase. It has also an hour-glass, with silver settings of elaborate design and good workmanship. It is arranged with subsidiary glasses for the half hours and quarters on the same frame, so that all will turn together at the same time. The pulpit is used for all the services, except the portion of the offices necessarily said at the altar.

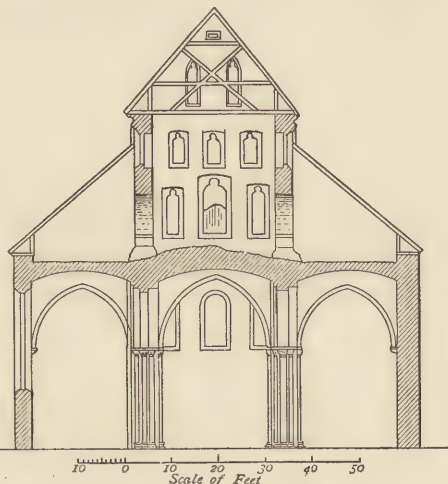
The building consists of nave and continuous chancel, each of three bays, of about 31 feet each, all of the same height and general treatment, but next the chancel the responds, and opposite pillars, are sufficiently large to suggest almost a central tower, and there is an additional narrow bay next the large central western tower. There is a large chapel of three bays, of good middle-pointed character, against the three western bays of the south aisle. It now serves merely as a vestibule to the cathedral. It may have been built as a lady-chapel, or it may have been a sort of Gallilee, or consistory court. It is too large and important for a mere *vapenhus*, and the eastern bay has an elevation of two steps as though to indicate the sanctuary of a chapel. It ought to be explained that a *vapenhus* is simply a weapon-house, a large porch or chamber, attached through the middle ages to the entrance of a Swedish church where soldiers deposited their weapons, and the peasants their tools, &c., before entering the church for worship.⁹

At the period when this chapel was built the exterior generally was remodelled. The walls were buttressed, and traceried windows of geometrical character were introduced, in the latter part of the fourteenth century. The east end is flanked with a square turret on either side, containing a staircase. These are of the Romanesque period up to the height of the roof, whence several stages of pointed work have been added. The lower stage is a vestry. They are capped with wooden cupolas, and like the western tower covered with metal. The upper portion of the east gable of chancel has been raised and curiously altered by the introduction of two tiers of cusped pointed windows below the level of wall-plate, and one tier above, of simple design. They are now mostly blocked. They are introduced in an unsatisfactory and unquiet way, and they are of construction and workmanship not in accordance with the upper stages of turrets, which are of geometrical-pointed character. They destroy the whole effect of wall space, whilst contributing very little to its decoration. These were the end windows of a kind of upper church or lofty stage, above the vaulting, through the entire length of nave and chancel, added apparently for the sake of exterior height alone. There is nothing to

⁹ Mr. Haig, whose notes on the Gotland Churches are printed at pp. 82-88, has stated elsewhere that, in the whole of the island, there are only two *vapenhus*, those of St. Klemens and St. Göran, Wisby. Such buildings are more common in Sweden-proper.

indicate its ever having been used for any purpose, the inequality of the surface over the vaulting rendering it unavailable for an assemblage of persons.

There is provision for a flooring of joists beneath the level of the sills of quasi-clerestory windows, some 17 feet above the vaulting. These windows (corresponding with the second tier of the gable windows) had originally the effect of a clerestory externally. They were, one may say, really intended for clerestory windows, not to the cathedral church beneath, but to the space above the vaulting, for this has its arcades, of roughly built pointed arches and flat soffits, on dwarf pillars only a foot or two in height. The windows are, however, now covered up with the lean-to roofs of the aisles, and the heavy corniced eaves-course of the nave roof. The exterior effect, therefore, is remarkably poor and uninteresting. A section of this part is here given.



On the north-west of the cathedral is a feature worthy of notice in the staircase between the tower and the end of the aisle, now terminating in a lean-to roof, considerably below the present roof of the aisle. From this height the staircase is carried in the thickness of the wall of the tower. The window openings have semi-circular heads under a semicircular containing arch, and are carried on double columns in the thickness of the wall. They were intended to be left open, but are now walled up with a very thin partition. The shafts and part of the jambs are polished inside, whether purposely or by friction of use I cannot say. It is very probable that the thin wall of this staircase may have formed only the outer facing of a thick wall of a side tower on the north, represented in a chart, to which I shall refer presently; the intramural passage on stairs, with the inner casing, having been removed, leaving the wall as at present only 19 inches in thickness. It is clear that the last arch of this staircase has been concealed by the raising of the aisle wall and roof. Great alteration has taken place in the south-west corner of nave, and a similar wall here may very well have been removed.

The style of the building is that of late middle-pointed period. The window heads are in circles and other forms, filled in with small and delicately cut pierced tracery, in geometrical patterns of not unusual design. Throughout the building there is a studied absence of uniformity in the details. Every window is different, not only in its tracery, but in its mouldings. The entrance consists of a projecting gabled portal. Every portion of the carving, every stopping of every moulding, every pinnacle, every bit of detail in fact, is scrupulously varied in design. Unfortunately the work is much mutilated, chiefly, I believe, through age and decay. The upper part of the gablet is filled with a rude sculpture of the Resurrection in mezzo-relievo. The lower spandrils are filled with an excellently cut medallion rose, of simple form, in a circle. Portions of the work have

the effect of having been painted red a good many years ago. This may be the effect of fire. The roof of the chapel is now in hideous form, spanning transeptally the whole length of the three bays. This was done when the roofs generally were reconstructed after a great fire at the end of the last century. Inside it presents a wonderful forest of timbers. Their scantling is about 7 inches by 5 inches, but all are framed alike, or nearly so, about 2 feet 6 inches apart, and without principals, but with good longitudinal bonding. Amongst these timbers, on the top of the vaulting, I was much astonished to come upon a number of stones, comprising pinnacles, crockets, gablets and gargoyles of the best period of mediæval work, beautifully carved. Except for several fractures, they seemed as fresh as from the workman's hand. But the evidences of their having been fixed were unmistakeable. One was a finial, 2 feet $1\frac{1}{2}$ inches across, large enough for a large spire; but there appeared to be no possibility of a spire ever having been built and taken down again. I subsequently learnt that they had formed parts of the chapel, and that they had been deposited there on the reconstruction of the roofs, at the end of the last century [Illustns. xi, xii].

I was so occupied with the churches that it was only just before leaving the island that I visited, for an hour, the interesting Museum of Antiquities; and only during my last ten minutes I came upon a sort of birdseye chart of the town, which might have suggested points for more careful observation, although I fear it would not have enabled me to reconcile with it the present state of things in respect of the cathedral. The church is there represented without the chapel, and without a central western tower, but with two western towers terminating in spires, one on each side of the nave, with the gable of the nave, arcaded right across, rising between them. The turrets at the east end are correctly given, but these also are finished with spires. The difficulty is how, subsequently to that date, such a central western tower should have been built, containing as it does on its four sides, at the height of the nave gable, windows of what would appear to be of the earlier Romanesque. The building of St. Mary is, nevertheless, a great puzzle, if we compare it with the Romanesque work, or Norman, of our own country; for it is said to date from 1190 to its consecration in 1225. Yet its character is very distinctly equivalent to that of our own work of more than a century earlier.

I find that Fergusson, who does not say if he has seen it, speaks of its erection as about A.D. 1100; of its having been burnt down in 1175, and rebuilt as now in 1225. If this be so, our history is made much clearer, both as to the cathedral and as to some of the other churches also. But in this case we must necessarily conclude, not that the whole was rebuilt, but only so far reconstructed as to change its whole appearance and character externally. The windows still existing in the wall between the south aisle and the chapel, which were left undisturbed in the remodelling in the 14th century, would appear to be the outcome of this rebuilding. They are lofty lancets, and are, excepting in their deep external splays, equivalent to our early first-pointed. They evidently superseded the Romanesque work, some of which, in the western bay, still remains undisturbed. In Scotland, we find the retention of the round arch down into a late period of pointed; but in Scotland the structural character of the work is not in accordance with

that of the Romanesque period. The date of St. Olof's is about 1100 ; its west doorway is Romanesque, of a character ruder and larger in treatment than the other work of the later period, and I conclude that it is of the 11th century—the vaulting and the bases of the pillars being of the later date. The date of the consecration of St. Katherine's has been given as 1412 ; but, as will be shown, it is absolutely certain that a previous church of equal dimensions was in existence here, in the period of the Romanesque, and was subsequently transposed into early-pointed, when the octagon pillars, with their arcades, were built. This, therefore, is but the date of its reconsecration after a long period of reconstruction. But the date of the chapel at the cathedral must necessarily be subsequent to that of the chart, that is to say, supposing the buildings shown in the chart to have been correctly represented ; and the date of the chart must be, in this case, subsequent to 1361, for the most prominent reference to the several localities made in the chart is to this monument :—

“ Epitaphium mille et octingentorum civium Vysbientium hic a Waldemaro Danae
“ Rege caesorum Anno MCCCCLXI Feria III post Jacobi : ” “ The monument of
“ a thousand and eighty citizens of Wisby here slain by Waldemar, King of
“ Denmark, in the year 1361, the third day of the octave of St. James.”

The chart becomes, therefore, interesting as a record of the architectural history of this building. It represents most of the other churches still in existence, as well as some which have disappeared. It represents also a fine harbour full of ships, with piers and turrets constructed, of course, of timber. I have, however, no evidence of the antiquity of the chart, and I am told that it may be of later date, and that no reliance at all is to be placed upon its architectural representation of churches, whether as having spires or chapels, or any special forms of plan, being correct. There are in existence notorious instances of misrepresentations of historical buildings in such charts as these. I do not like to ask Members, therefore, to take all this for granted without warning them of the danger of doing so.

2. St. Nicholas, the church of a Dominican convent, said to be of A.D. 1097, stands about 200 yards to the north-east of this, and next to St. Katherine's the interior of this church is the most striking of the number. It is of considerable dimensions and of fine proportions. The pillars alone rise over 30 feet, and the central vaulting is lofty. The church is about 64 feet in breadth, and 170 feet in length, exclusive of some 25 feet length in the apsidal termination of the chancel. Its walls are 4 feet 11 inches thick. There is but little or nothing to denote the real division between the nave and chancel. The aisles, in this case, are continued through, but four bays would seem to belong to the nave and two to the chancel, defined by a projecting turret staircase, now destroyed, on the North side, connected with exterior buildings, of which some traces still remain. This turret was approached by an intramural flight of steps, extending from a doorway in the easternmost bay of the aisle. The apse is of a date later than the church, at which period also these eastern portions were partly remodelled into pointed work, with windows of pierced tracery. The west windows also were similarly remodelled. Moulded vaulting ribs, still visible at the east end, were introduced. The windows have chamfered

plate tracery eight inches thick, the jambs being built into the middle of the wall with straight joint. It is finished with a deep splay outside, as well as in, of coursed work roughly hammered, but with dressed quoins. The three responds against the aisle walls, supposed to carry the vaulting of the four westernmost bays, unquestionably betray subsequent remodelling. They show a half column giving a projection of 20 inches besides the cap; but there is neither arch member to be carried, nor any corresponding member on the opposite pillar to carry one. The soffit of vaulting springs from the line of wall. As they stand they would become merely a sham to carry up the eye; and the pillars, with the vaulting, must have been built in the pointed period, when so much of the building was remodelled. This is the more probable, seeing that in the spring of the vaulting ribs are several traces of the brickwork of later date. The pillars are about 3 feet square, with a chamfered abacus and base. Material reconstruction may have been carried out, not from choice, or change of taste or fashion, but from necessity; perhaps from the defective construction of the earlier vaulting, or in consequence of partial demolition in those warlike times. You will bear in mind, for a little while, this great probability of the main arches having been rebuilt. Some of the vaulting most certainly was, if not all. The main entrances are opposite each other in the third bay from the west end. There was also an entrance close to the west wall, on the south side, having a tympanum with incised figures of St. Augustine and St. Nicholas. Over this is a circular window in the centre of the bay. A noticeable peculiarity in this church is the treatment of the western gable, which also was partially reconstructed in pointed times [Illustn. xiii].

3. St. Gertrude's was called the church of the "Kopmanns," or of the Netherland merchants. It is said to have been built about A.D. 1167. The side walls were nearly 4 feet thick. There is now to be seen but little more than the fragment of an eastern semicircular apse, square outside like some others, and the tympanum of a western doorway. In this tympanum St. Gertrude is represented as abbess, holding her pastoral staff in her right hand, and a small church in her left. There is also a shield on either side of her, one of which shows a simple quartering, and the other a small ship or boat without a mast.

4. The *Helge-Ands kyrkan* (Church of the Holy Ghost) was a hospital church, an octagon of about 48 feet by 45 feet diameter, somewhat irregular in its setting out, with a chancel little longer than square. The height of the chancel embraces two storeys of the nave which open into it, with an upper as well as a lower chancel arch; so that, for the services, the chancel¹⁰ is common to the two storeys. The chancel is square on plan externally, but apsidal internally. This feature is obtained by the construction of a small chamber or cell on either side of it, in three storeys, with very narrow flights of steps ingeniously devised, leading also on to the roof. I do not know the purpose or the origin of the double storey, unless it were for the separation of sexes, or of the conventual community attached to the church. In Germany there are several churches thus arranged. The main entrances are on the south from the precincts, in the centre of that

¹⁰ Mr. Carpenter refers to this in his note at page 81.

side of the octagon, and on the north from the main road, but the doorway is further west, nearer the angle. The south doorway is well designed and has a cusped tympanum. Inside each of these entrances, in the thickness of the walls of the north-west and south-west cants, rise two staircases meeting together in the centre of the west wall on to the upper storey. They were arranged, no doubt, for one staircase to be used in ascending, and the other in descending. It would be exceedingly difficult for a number of people to pass each other in so narrow a space. These staircases are open to the lower nave with arches, caps and bases. A staircase is continued over the other, on the north side only, to a third storey above, of which some of the window-sills still remain. In the second storey there is on the south side a recess within a double arch and pillar. At each end of this recess is a small cavity for a locker or aumbrey on the left, and, perhaps for the same purpose, on the right. The staircases and recesses have some pierced cusped windows in the inner wall-case.¹¹ The octagon pillars, which are about 3 feet 9 inches in diameter on the base, are pushed out of the upright downstairs, and still more so are the circular pillars on the second storey. Much of the vaulting of this storey is gone. There is an opening, about 7 feet across, in the floor between the two storeys, said to have been fitted with a grating at one time, but now having a rude stone kerbing around, which is being repaired. It may have been designed to allow of the unison of the singing and of the services in the two storeys. South of the chancel, near the chancel arch, is a simple well designed doorway having a solid tympanum, with a small semi-circular arch cut up into its soffit, and a moulding continued round. The third storey was finished with a gable, rising on each cant of the octagon, and a pyramidal roof in the centre [Illustn. xiv].

5. The Church of St. Klemens consists of a nave of three bays with aisles, a chancel of two bays with transeptal aisle on south-west, and a western tower about 26 feet by 25 feet inside, and walls 8 feet 8 inches thick. Above the roof these are reduced to about half the thickness, allowing of a wide set-off externally to serve for purposes of defence or observation. The nave and aisles within the walls represent the proportions of a very moderately-sized English village church. The way up the tower was within its south wall, and I made two sketches from the 4 feet set-off where the upper stage begins. It is approached also by the staircase in the north aisle wall of nave. There are on the north side marks of some sort of a building of two storeys opposite the transept. There is a fine south doorway which is now within a storehouse built outside it. The scroll-work carved on the capitals of this doorway may be seen repeated in several other churches.

6. Of the Church of St. Olof, which stands in the Botanical Gardens, little more than a portion of the tower, the base of a pillar and a respond now remain. This church is said to have been built in the year A.D. 1100. The tower has a fine western portal, and, as is the case with other churches, staircases are carried up in the thickness of the walls, in a direct line from doorways in the nave, on each side of the

¹¹ See the "Section looking South," by Mr. Haig, in his notes at page 85. See also the "South Elevation" at page 84, and the plan of this church in Illustn. ix, fig. 4.

tower arch. Like several other of the earlier churches, the first bay of the nave was a narrow one, perhaps, half the width of the other bays. The tower is vaulted with undressed thin stones. The spring of the vaulting remains in the nave and aisles against the tower, corbelled out in rough stones without vaulting ribs.

7 (and 8). St. Drotten and St. Lars are called the "Sisters' churches," as having been built by two sisters who were determined to outvie each other in the design of their churches. The legend, beautiful or curious as it may be, can be but a legend, for St. Lars (or Lawrence) is reputed to be forty years earlier than the other. It is more likely that they were called the sister churches from a certain sort of similarity in their remarkable plans, and from their close proximity to each other, being only about 50 feet apart. They do not stand parallel with each other, the lines of their axes diverging some 8 or 10 feet at the east end. The plans of each are shown together in Illustn. ix. The southern church is St. Lars, which may be called cruciform in plan, having a square nave extending laterally into quasi-transepts, with small aisles at the four angles, and a chancel with semi-circular or rather horse-shoe apse. In the north-west wall is a singular recess or chamber about 12 feet long by 3 feet wide. There are five intra-mural staircases, with passages and openings into the church through small arcades. The west doorway is on a grand scale, each jamb with two shafts and a semi-circular head. The north doorway has externally a square member and then a wide splay outside and in, with a slab in the middle between them as a sort of frame. It strikes one as a primitive arrangement corresponding with the detail of the earlier windows, and possibly it may be of the same date as the west and south doors; it certainly indicates a contention for the preservation of local style as against innovation. The external plinth, consisting of a bold torus, is the same in both these churches, except that in the later church it is 7 inches deep instead of 6 inches. The sentiment and character of the two are so essentially different that I cannot but look upon the assumed later doorways as the result of re-edification, the earlier one having been constructed for the reception of the massive wooden door frame, which was prevalent in the earlier work in Norway and Sweden, before the more general use of dressed stonework.

8. The northern of the two churches is St. Drotten's. This may stand in some way for St. Mary, or it may refer to some local royal saint or foundress, from "Drottening," which signifies queen. The plan of this church gives an apsidal sanctuary, separated by an arch from the chancel, a nave with north and south aisles, a south-west porch and chapel, or baptistery, or Gallilee, or *vapenhus*, or whatever it may be called, and a western tower. Here, again, in thick walls are the usual staircases, having arcaded openings into the church at various heights. These arcades have round shafts with square caps and bases and semicircular arcades. The nave of 3 bays forms with its aisles very nearly a square. The pillars are square and again the arches which carry the vaulting are pointed. The mouldings are much more developed than in St. Lars. A few alterations were made in pointed times, especially in the chancel, by the raising of the walls and introduction of traceried windows. The apse has a very rude and early character about the windows and its corbel table. The date assigned to the building is A.D. 1086, and

the pointed work evidently was of a later period; so also the tower, which is nearly 120 feet high and 35 feet square. In the upper part of the tower, on three sides of it, is a row of putlog holes which carried joists for a gallery as a look-out.

9. St. Katherine's is the church of the Franciscans or Grey Friars. Originally of the Romanesque style, it was wholly remodelled in the pointed period [Illustrn. xv]. Many indications of the earlier style still exist, in blocked windows, and fragments of detail. The western tower is now in an unsafe condition; and the cupola, together with some of the walls, is being removed. I do not know what is proposed in the way of reconstruction or preservation of the west end generally, and it is difficult to see what was the original arrangement of this part of the church. There are on the west wall of the south aisle (perhaps at one time a tower or baptistery) remains of decorative painting, consisting of a frieze with medallions, containing upper portions of saints, 9 or 10 feet from the floor, and a pattern beneath. Outside of this, on the south, was built the monastery in three storeys. Bergman says it is recorded in the annals of the monks, still in existence, that the monastery was founded in 1233. The choir, with its polygonal apse of five sides, was built in 1376 to 1391. About the year 1400 many pillars and arches, which had fallen, were rebuilt, and in 1412 the church, with its new choir, was consecrated. The vaultings are now almost wholly gone. The chancel arch is over 50 feet in height. The upper part of the tower is supposed to be of the date of 1685. From the north elevation the ground rises rapidly from west to east, and the design well follows this rise. From this elevation it would at first sight appear that the division of nave and chancel was well defined. I should give naturally, and without hesitation, four bays to the nave and two to the chancel. But here is only the north aisle, not the chancel and nave; and the interior distribution differs entirely from the elevation. The two external bays without are indeed three bays within. The lines of pillars are far from straight, and their spacing is very remarkably variable. Starting with the gradation from the west, the first intercolumniation is 17 feet, the next 16 feet, then 14 feet, 16 feet 4 inches, and 21 feet 9 inches, 15 feet 3 inches, and 15 feet 6 inches. The general width of the nave is about 23 feet, but it varies very much, that of the aisles is from 12 to 13 feet. A pillar comes opposite the dwarfed buttress, west of the easternmost doorway on the north side. Opposite this doorway in the south wall, and opposite one of the existing pillars, is a blocked window of the earlier date. The spacings, therefore, were wholly changed in the pointed period, as was frequently the case in such remodellings, in order to effect a reconstruction upon a different system of geometrical proportion. Here a reconstruction similar to that of St. Nicholas is absolutely certain. The pillars are octagonal, of about the same dimensions, but the bases, instead of having a plain chamfer, which might be of almost any date, have mouldings of distinctly pointed character. And I found further, and still more distinctly, the remains of vaulting ribs of the later work. There is a charming piece of corbelling for the arches on the east piers, and of stilting, also of distinctively pointed character. I am indebted to Mr. Henry Jarvis, jun., a Fellow of the Institute, for a photograph [Illustrn. xv] of the remains of this church.

10. I now come to the Church of St. Hans (Scandinavian for St. John). Close to

this stood the Church of St. Peter. Whether any of these ruins belonged to St. Peter's, or not, it is not easy to say; they are sufficiently extensive to justify such a supposition. St. Hans is called, by Baedeker, an insignificant ruin, and I was almost induced to pass it by. It is a ruin it is true, but it is perhaps the most significant of the whole number. Enough remains to tell of its grandeur when it was first built, and still more so when it was reconstructed and enlarged. Is it mere insignificance to have the west wall of a nave 6 feet 3 inches thick, with a window jamb, excellent in design and in workmanship, 23 feet high? Is it nothing to have moulded corbels, admirably treated and proportioned, with a projection of nearly 20 inches to carry ribs for vaulting over a nave with a span of 43 feet? The real insignificance surely must be in the eye which, in the absence of the whole building, is unable to grasp the indications of a grandeur so plainly displayed. According to our mode of computation this work would be of the date of about 1180 to 1200, on an earlier church of the 11th century. The remains are not many, but they are large and massive, of a masculine and interesting character. On the north side are the massive piers of a grand tower.

11. The Church of St. Göran (St. George)¹² being outside the town, was not visited by me. But it is a remarkably interesting instance of a church with a "bisected Nave," such as is to be found at Caythorpe in Lincolnshire, Clatford in Hampshire, Hannington in Northamptonshire, and elsewhere [Illustn. xvi].

Having now taken a review of these churches, I cannot refrain from quoting a notice of them made nearly fifty years ago, and subsequently laid before this Institute by my namesake—one John White. It is from the elder Laing's *Tour in Sweden*, in a letter preserved in the MS. TRANSACTIONS of the Institute. Laing observes:—"There are ruins of twelve churches [in Wisby]. These are the most interesting Gothic edifices in Europe. They show the style of building, ornament, and workmanship in one precisely determined age, and are not like the large Gothic cathedrals in other countries, the work of one or two centuries, added to, altered or rebuilt according to the varied taste or funds of successive generations. They are buildings of the 11th or 12th centuries, older than the oldest specimen we have in England of Norman and Saxon buildings, and are, on this account, extremely interesting, as they show in the arches of the same period the characteristics which we suppose in England to distinguish two distinct periods of Gothic architecture. This is the first idea that will occur to the traveller when he sees from his window round Saxon and pointed Norman arches used indiscriminately in buildings of the 11th or 12th centuries. The oldest church here, in which the pointed arch, and what we call the Norman style of Gothic architecture, is found is St. Lawrence. . . . It is a cross church with a transept, and pointed and round arches are used indiscriminately, even in the lower part of the building. . . . St. Nicholas, again, built 1097, is a large edifice, altogether in the Norman style, with long windows, and all the arches, which are very beautiful,

¹² Mr. Carpenter refers to this church in his note at page 82.

"pointed. It is evident that the different style of the arches does not denote a different age in these buildings, and these are older than any in Britain of a known date." And he concludes, "Wisby is the Rome of the modern architects who will deal in the Gothic."¹³

Mr. Laing undoubtedly exhibited his appreciation of what he saw, rather than his architectural and antiquarian knowledge, or his powers of discrimination. I must, however, bear testimony to the merit and value of his highly interesting and well-written book. In every case, I think, where the Romanesque and the pointed are found in contiguity we have seen the traces of the subsequent insertions or reconstructions made in the pointed period, together with the remains of the Romanesque beneath, as I have pointed out in the case of almost every one of these churches. At the same time, we must fully appreciate the enthusiasm with which he speaks of this interesting place, both as a curiosity and as a valuable field for study. The only three churches to which he specially refers, are St. Drotten, St. Lars, and St. Nicholas; and in all of these, substantial portions of the fabric were distinctly of the pointed character, with Romanesque remains beneath. See, for instance, the south wall of the chancel of St. Drotten. The gable of the Romanesque doorway, and two small round-headed windows above it, have been cut away to receive a later round-headed window, which is not of the same character as the three-light cusped window, also introduced into the south aisle contiguous to it, and what I have already said in reference to the other churches will be possibly remembered.

I must now, in conclusion, briefly summarize a few of the leading characteristics of these remarkable ruins. First we have great thickness of wall and numerous intramural staircases, with easy access by them to upper storeys and roofs, probably for purposes of out-look and defence. In several of these churches the staircases are so arranged that you may go up one and so down another. This, probably, was to obviate the difficulty of persons meeting on the narrow stairs: one was used for the ascent and the other for descent. Then we have the exclusive use of vaulting; the successive development of style in the several periods, though specially adapted to local circumstances. We have evidences of dignity and grandeur, and of artistic finish; the walls are mostly rough, but with substantial stone quoins and dressings; great importance is given in nearly all instances by a dignified and handsome entrance doorway. There is great simplicity of treatment generally, though with carefully considered detail in some of the more important parts. Then we have the peculiarity of the double wide splay in the windows, handed down through the Romanesque and pointed periods alike.

The material generally is of hard limestone, or a coarse description of marble, varying in quality, and assimilating in appearance, to something between Kentish rag and granite. In many parts it is much decayed, whole masses of detail having disappeared, but this may have been from the effects of fire. Some of the stone consists of a conglomerate of pebbles and broken pieces. There is a pervading impression of

¹³ This quotation, from Laing's *Tour in Sweden in 1838, &c.*, may be treated as a curiosity of archæological description, made at a time when the history of mediæval architecture was less understood than it is at present. See Mr. Haig's commentary on the supposed antiquity of the ruins, at pp. 82-88.

ruin and neglect about the whole, and yet, strange to say, there is some trifling repair going on, chiefly in granite; it may be merely of some two or three arch-stones in a doorway, or vaulting, or wall. In several instances I have noticed granite shafts, recently cut, lying ready apparently to supply, some day, the place of those which have long since disappeared from the jambs of the doorways. In the work equivalent to our Norman I found the same finely-dressed square and jointed masonry of the pilaster carried up flush from the plinth, with a weathered capping on the top.

The buttresses to the apses of St. Drotten and St. Lars, on the contrary, though little better than pilasters, some 10 or 12 inches square, are merely monoliths let into the walls with a straight upright joint. Their edges are finished with a large bead. Then we have also the finely-dressed work to the buttresses and walling of the later-pointed work of the apses of St. Katherine and St. Nicholas.

Amongst the specialities of detail to be found in the work is the deep splay of the windows outside as well as in. In the middle of the wall between the splays is built up a slab of marble, forming the jamb for the tracery head. The only work which I have found in England with a double splay in this period, which much puzzled me upon its being opened out by the removal of the plaster, was that of Hugh of Avalon, afterwards Bishop of Lincoln, at Witham Friary, Somerset; though this had been set down as Georgian work. In mediæval work the outer member commonly bonds over the inner one. In this case the outer member of the arch faces up against the other, as though the wall had been thickened to this extent. The wide external splay is found also in the churches of Austria, about Trent. It was suggested, no doubt, by the great thickness of the walls, and by the difficulty of obtaining stones which would work easily for a finer finish. They are finished often in the same random coursed work as the walls, but in some cases with dressed quoins, and in some with dressed work altogether. In many of the churches there is a large western portal. There is commonly a good and bold plinth from which a pillar or flat buttress rises flush with it. In the west gable of the Church of St. Nicholas these buttresses, though flush with the face of the plinth, have a moulded base on their sides. There is a singular feature in the occasional use in the Romanesque work of a very common-looking ordinary brick. It appears sometimes in the body of the wall or pillar, behind the limestone. Sometimes there are small patches of repairs done with these bricks, and in the case of St. Katherine not only are some of the springings of the spandrels of vaulting of later date done in brick, but there is a moulded vaulting-rib of good workmanship. The curious part of it is that, in the midst of work in such substantial material, and of such masculine character as that of St. Nicholas, there should have been constructed in such brick, in the old work, recessed traceried circles of poorest common-looking work, in the centre of which is said to have been a large and valuable carbuncle. At first I thought they must be of more modern work, but the south wall of the transept in the Church of St. Klemens has actually been cut away to receive a window of 13th-century date, and the position and treatment of the circles in the western gable of the Church of St. Nicholas are such as to indicate their being in their original

position. Brick must have been introduced for the sake of the colour alone, which otherwise was very sombre, and the material may have been of some value in that country at that time. Even in the arch of the western portal of St. Olof's, there was a red tile introduced into the chase between the square and the large roll-moulding forming the principal member of the arch. A remnant still exists on either side, where it had a resting place on the abacus. The early Romanesque is a good deal like our own Norman in the members of its round arch, its shafted pillars, its square abacus and plinth. In the pointed work I found the square pillar, with simple cap and base, and in the windows some rather thin plate tracery without featherings to the cusping. But there are also some good specimens of carved caps and moulded vaulting ribs such as may be found elsewhere.

We may conclude that the interiors generally were plastered, for the plastering in some places has not entirely disappeared, and in one case, at the west end of St. Katherine's, can be distinctly traced the remains of ornamental colouring already spoken of. The wonderful preservation of the ruins for so many centuries is to be attributed mainly to the buildings having been vaulted. Very many of the vaults have fallen, but the substantial walls required in the first instance to carry them have resisted the storm and frost prevailing for so many months in that climate. No walls have been pushed out by rotten beams; on the other hand some have suffered from the want, or it may be from the destruction, of proper abutment to the arches. Nothing indicates the nature of the water-shed. It may have been some description of thatch, but more probably I think of wood shingle, which I believe to have prevailed as a roof-covering in former ages.

In the Museum of National Antiquities, at Stockholm, many remains may be seen of fonts and capitals, stalls, reredoses, and other stonework and woodwork of good character, which were removed from these churches, showing that they must have been worthily fitted up.

WILLIAM WHITE, F.S.A.

[Notes by R. Herbert Carpenter, *Fellow*.]

From Stockholm the curious island of Gotland is easily visited by those who can endure a sixteen hours' sea voyage in a small steamer. It is true that occasionally large steamers run, and touch there on their way to Kalmar and Denmark; but, as a rule, the steamers take the Lake Malar route, which involves the going through a lock on the canal at Södertelge, and the length of this lock necessarily fixes that of the steamers; still they are good sea boats, and fairly comfortable. The passing through the lake and between its numberless islands is very pleasant. Almost all are but masses of rock covered with primæval forests, and navigation is so difficult that this part of the route must be gone through in daylight. The navigation of the steamer requires great skill especially in the long, winding, narrow canal on each side of Södertelge lock, and along the buoy-marked channels beyond. Wisby is always reached in the dark, and one

wakes up to find the steamer moored to its quays, under its old embattled walls and towers, and picturesque, painted timber warehouses. It is indeed like stepping back several centuries to go from modern Stockholm to grim old Wisby, and its deserted streets and ruined churches; yet, in its decay, it is one of the most interesting cities of Europe. Passing through the streets to the churches, it is curious to find how low and common-looking the wooden houses are, and what wide spaces there are of gardens and unoccupied land. The effect is that of an overgrown village, with here and there a few of the great red-brick houses of the merchants towering up, with high-stepped gables and pointed windows; yet these have a poverty-stricken look, and are covered with whitewash.

The churches very much remind one of our own charming smaller Cistercian churches, such as Kirkstall, Buildwas, or Croxton, both in their severe simplicity and in their excellence of design. As a rule, the churches are small in scale, as were the Greek churches, the influence of which worked round to Gotland from Russia. The plans may be divided into three varieties:—A, small nave and square-ended chancel and porch. B, square plan, with four detached pillars dividing the area into a nave, and side aisles of equal height, covered by one great gabled roof, with a chancel and west tower and sacristy. C, a long nave and chancel, with aisles, and an apsidal termination and a western tower.

1. THE CATHEDRAL CHURCH.

Of the numerous churches, only one [Illustn. ix] is used for worship; it was originally built by the Lubeckers, and is their characteristic style of the 12th century. It has a great west tower, with aisles brought up to its western face. The greater part is vaulted with plain Roman vaults over nave and aisles, with moulded diagonal ribs only over its three eastern bays. The whole interior is so denuded of detail and whitewashed that all its interest has gone, but the exterior is very striking. The two eastern towers flanking the sanctuary are lofty, octagonal, minaret-like erections, like those of Trèves and of the Church of the Apostles at Cologne, but are not all of one date, for the upper portions are of the 14th century, and the quaint bulbous spires, like that on the western tower, are of post-Reformation date; yet the three, together with the great roof spanning both nave and aisles, have a very picturesque effect [Illustn. x]. The most interesting portions of the church are the additions of the 14th century, one in particular, a chapel, next to the south aisle; it is a lofty building of three vaulted bays, with a rich gabled doorway in the central bay. The vaulting rests on clustered shafts, with bases of a decided French character. The windows are very large and of four lights, and the heads filled with elaborate geometrical tracery of circles enclosing trefoils in various combinations. They differ in design, and are of unequal merit.

4. THE CHURCH OF THE HOLY GHOST.

One of the churches—the *Helge-Ands kyrkan*—differs in plan from all the others, and is more like what we should call a Templar church. As we approach it, we see rising above the trees a wide, lofty, octagonal building, almost like a tower, with a

short, square-ended chancel, of lower proportions, projecting from it; and, on entering it, we find ourselves in a vaulted church, with four detached columns inside the octagon, making five square and four triangular bays, all of which are vaulted, and have semicircular arches; but the central vault has an octagonal opening in it, into an upper church. This is of the same plan as the lower, and is reached by staircases in the thickness of the massive walls; its columns are slighter than those underneath them, and carry simple pointed arches, with portions of the original vaulting. The chancel opens into both churches by a lofty semicircular arch, and thus serves for both of them; it is apsidal internally, though square externally, and it is now open to the sky, but was formerly covered by a stone semicircular vault.

This double church, with chancel common to both, is certainly the peculiarity of the *Helge-Ands kyrkan*. There are, of course, in other instances in Gotland, in Bornholm, and in Denmark and Sweden, several examples of churches circular in plan, with apsidal chancels; and in Germany we find examples of the double church opening into each other by openings in the vaulting between them, such as the chapel at Schwartz Rheindorf and at Lausberg, but there each has its own altar in a two-storeyed apsidal chancel. Then, again, there are examples, contemporaneous also in date with that at Wisby, of the combination of a circular and double church, each with its groups of columns, at Thorsager in Denmark, and Osterlars in Bornholm;¹⁴ but in these the lower church only opens into the chancel, and there is no opening in the vaulting between them. In our own English examples, such as the Hospital of St. John's House at Sherborne—an almshouse refounded in the 15th century by Bishop Neville of Salisbury, for a certain number of aged men and women—even now, as of old, the men sit below and the women above, and look down over the upper part of the screen into the same chapel; and, considering this, the question is—was this purpose had in view in the example at Wisby, or was the upper church used only by a sisterhood connected with the hospital? In the *Ecclesiologist* of 1848 there is a very interesting letter by Mr. G. R. Gordon, then of the British Legation at Stockholm, who also raises these questions, and suggests another use—that it was for infectious diseases; but, on the whole, he inclines to what I cannot but think is the most reasonable theory—that the upper church was for women, to separate them from the men as was the rule in Greek churches, as, for instance, at St. Sophia, Constantinople, where the great galleries were used in this way. There is abundant evidence to connect Byzantium with Wisby: numerous coins are continually found in the latter place, and the Church of St. Lars was built for the Greeks. As to the use for a sisterhood, Alban Butler, in his “Life of St. Bridget of Sweden,” speaks of the convents founded by her for men and women contiguous to each other, but with a common church, “in which the nuns keep choir above in a doxal, the men underneath “in a church; but they can never see each other.”

There is a tradition, which I cannot but think is a trustworthy one, that there was a third storey over, with a high sloping roof, just as can now be seen at Osterlars and

¹⁴ Described and drawn by Horace Marryat in *A Residence in Jutland, the Danish Isles and Copenhagen*. 8o. Lond. 1860.

at Thorsager, where there is even a fourth storey. Altogether, this Wisby church is peculiarly interesting, both from an antiquarian and a theological point of view.

11. THE CHURCH OF ST. GÖRAN OR ST. GEORGE.

A most pleasant walk beyond the northern walls brings one to the small church of St. Göran, commanding a magnificent view over the wild country, the foreground of which is all cut up by the old moats and entrenchments in front of the long line of the old walls and the numerous battlemented towers, conspicuous amongst which is the grand North-gate Tower, all dating from the earliest days of Wisby's greatness, and all wonderfully well preserved. Beyond is a great expanse of calm blue sea, and the rocky headlands of the coast. The whole reminds one forcibly of the western walls and towers of Stamboul, with the same wild country and sea beyond. St. Göran is supposed to have been for the use of a hospital, and is very peculiar in its plan, its nave being divided by a central arcade of three arches, thus dividing the groining into six equal bays. One of the pillars remains, nearly six feet square. The eastern arch rested over the apex of the arch into the chancel, which was thus common to both naves. The windows are all lancets, and, like the doorways, are round-headed. The chancel arch is, however, pointed. One roof spanned the two naves, and all the old lofty gables remain; and on the outside of them are grooves in which the wooden construction of the roofs was repeated, just as we find in Sussex and Surrey; but all wood has now disappeared. This church, unlike those in the town, which are under Government care, is left to take care of itself, and one is thankful that it yet survives so perfect. At Folo, in the island, is a church of similar plan; and in England, too, there is an example at Hannington [Illustrn. xvi], which, however, was not vaulted, the central arcade rising nearly to the ridge of the roof of the double nave. The arch, as at St. Göran, springs directly over the apex of the chancel arch. The effect, though curious, is not particularly good; but at the great Dominican church at Toulouse the effect is exceedingly grand, where the central arcade is arranged with one common apse, equal in width to both the naves, all vaulted at one height, and for preaching purposes such a plan answers well.

R. HERBERT CARPENTER.

[Notes by Mr. A. H. Haig in explanation of his sketches.]

THE TOWN OF WISBY.

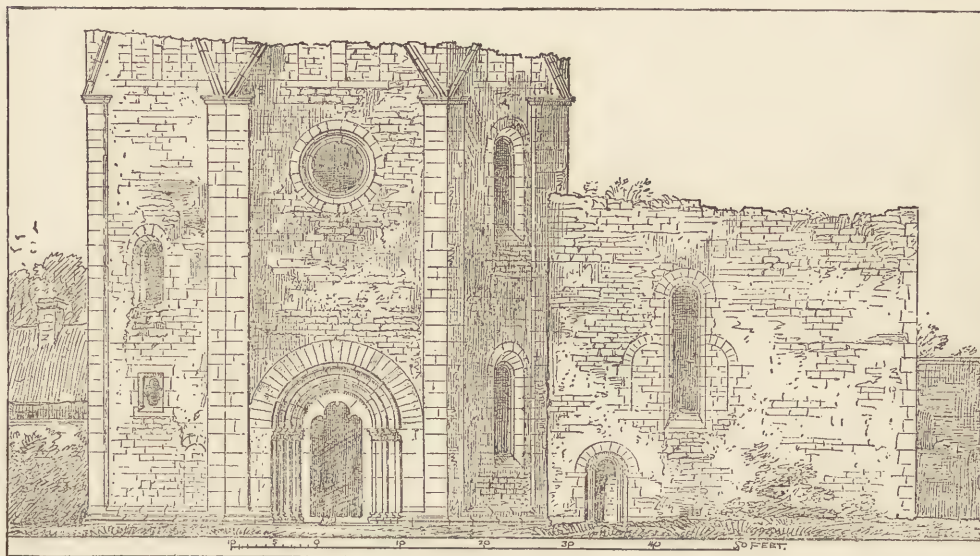
Illustrn. viii.—The year 1288 is given as the date of these walls. But the citizens had some years before this surrounded the town with a wall in order to be better able to defend themselves against the peasantry with whom they continually quarrelled. This first wall was much lower than the present one, but most of the large towers belonged to it rather than to the later addition, which the Swedish King, Magnus Ladulås, permitted the citizens to build in 1288. The old wall was strengthened from the inside, and increased in height as well as thickness, and between the already existing large towers smaller ones were corbelled out from the walls, so that originally there were

forty-five towers altogether. The wall was then 7200 feet in extent towards the land side, and 4000 feet towards the sea. A great part of the sea wall is gone, and at the present day there may be some thirty-five towers left. Five of them contain the town gates, of which three are still in use. One of those not used is seen in the sketch from outside the walls. This as well as the others had portcullis and draw-bridge. Towards the sea are now but three towers remaining, and the sea wall had four gates, not defended by towers. Three of these gates are used at the present time. The south-western one led to the old harbour. The wall was at the south-western corner of the town, incorporated with the old castle or fortress, called Wisborgs Castle, began in 1411. Scarcely anything remains of this extensive castle. Many romantic stories are told of it; Eric of Pomerania made it a veritable sea robbers' nest, and after him the great Admiral Severin Norrby and others held it sometimes under Swedish, sometimes Danish, power. The castle was, in 1679, made useless as a fortress, and since then its remains were burnt to lime to be used first for the building of the town of Carlskrona, founded by Charles XI, father of Charles XII, and afterwards at the building of the Royal Palace, Stockholm. For like purposes have many of the ancient buildings in Wisby been utilized during at least two centuries. Architectural fragments of all kinds will be found built into comparatively recent most commonplace buildings of the town, for the authorities, not having had the slightest regard for the ancient monuments, used up their materials thus ruthlessly.

Illustn. xiii.—This sketch, taken from the high north-east part of the town, shows the ruin of the Church of St. Nicholas, and the towers and a gable of St. Drotten, the sea beyond; this part of the town was repeatedly destroyed by fire in the middle ages. It was in the west gable of St. Nicholas, the back of which is seen in the sketch, that the great lustrous carbuncles of Baltic marine tradition were placed; they shone out brightly at night over the sea, and were of great service to the mariners, to whose special patron the church was dedicated. St. Nicholas church belonged to the Augustine monastery, and it is now prosaically conjectured that the cunning monks, by lighting up strong lamps behind brilliant ruby glass, produced the gem-like effect, thus securing rich offerings from the believing and grateful mariners. I myself will not give up the idea of the carbuncles.

Illustn. xiv.—The *Helge-Ands kyrkan* (Church of the Holy Ghost) has an octagonal nave and a square chancel with semicircular apse internally; square east end externally; the corners at sides of apsidal termination are used as vestries and store-rooms. Nave in two storeys and bell-chamber above. Chancel in one storey, open to both lower and upper nave. Internal dimensions of nave: 47 feet north and south, 45 feet east and west; length of chancel, including apsidal end, 34 feet, breadth 26 feet. Four octagonal columns in lower nave, four corresponding round ones in upper nave; no columns in chancel. Octagonal opening, about 7 feet wide in the centre of vaulting between the two naves. Almost semicircular altar-niches in north-east and south-east walls of both naves; in south and south-west walls of upper nave wide recesses, each under two semicircular arches. In south-west and north-west walls of lower nave staircases lead to upper naves, meeting in the centre of the west wall above. A rude staircase in the north-west wall of upper nave leads to the bell-chamber. A round-headed, tall, and narrow window pierces

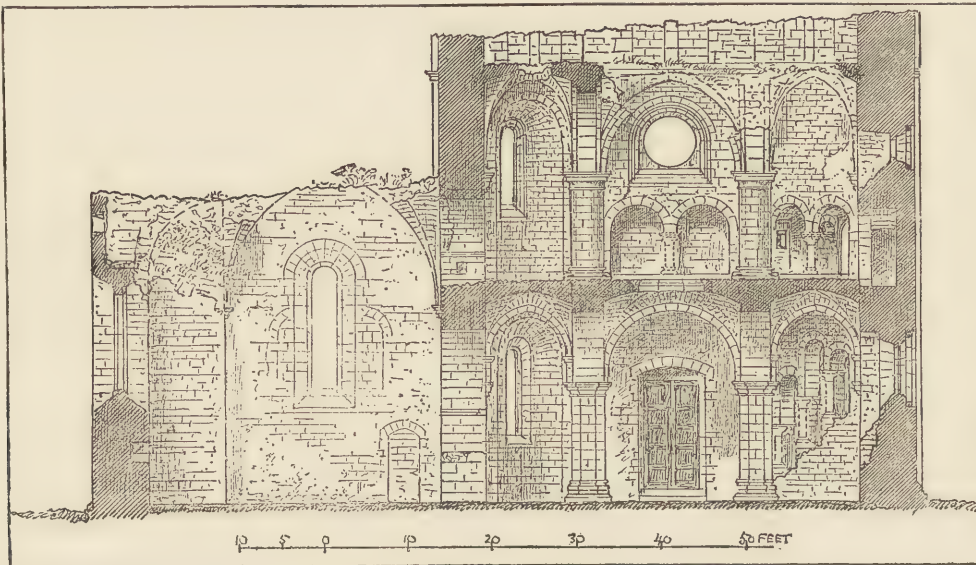
each of the four semicircular altar-niches in both naves. Small six-foil windows pierce the west and north-west walls of lower nave, and a quatre-foil the south-west wall. In the south wall of upper nave is a large circular window which formerly had tracery, and in the west wall is a small circular window. A large round-headed doorway leads into the



SOUTH ELEVATION.

nave from the south, a smaller one from the north ; the former enriched with columns and carved capitals, the latter plain but with a good moulding. The roundheaded priest's-door to the chancel is blocked up, as are two small round-headed windows ; between these was inserted a large one of similar design. Each of the walls of the nave finished with a gable, now mutilated, and the roof was probably an octagonal pyramid. Portion of cornice remains as does also a part of that of the chancel, which was covered with an ordinary saddle-roof. Height to base of gables of nave 50 feet ; to cornice of chancel about 30 feet. A.D. 1046 is given by Strelow as the date of this church, but the statement is quite unsupported. The church was from the very beginning a *Helge-Ands-hus* (house of the Holy Ghost), a hospital-church ; and as Olof Haraldson (St. Olaf) first introduced Christianity into the island in 1028, and the earliest churches were built of wood, it is not likely that this church could have been built as early as 1046. The character of its construction and its details is that of the transitional period ; it is one of the latest in Wisby, and cannot have been erected earlier than at the beginning of the 13th century, and this may apply only to the chancel, the south wall of which seems to indicate an earlier date than that of the rest of the building. In all probability, about 1250 would be the date of the church, generally speaking. At this time this part of the town was crowded with domestic buildings, as well as those of the hospital, and the space for building the church upon was very limited. To supply the needed accommodation it became therefore necessary to build the nave in two storeys. It was not built so as to accommodate nuns, as there was no nunnery there, nor in order to separate the sick from

the healthy, the staircases being quite open to the nave and the entrances common to all; and as regards separating the sexes, that was done in the other churches also, as is the custom in this present day, the men occupying the south and the women the north side of the nave in the Gotland churches. From the top of this church, which is easily accessible,



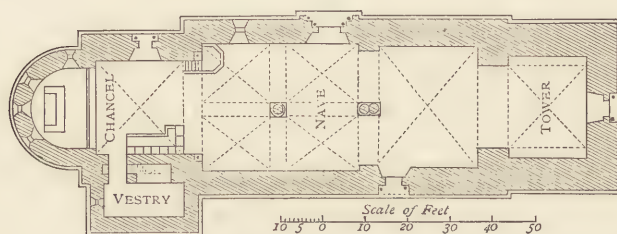
SECTION LOOKING SOUTH.

there is a lovely view over the town and the sea, especially fine at sunset, which is often most brilliant in this altitude, and although not so very far north, the peculiar luminousness of a summer's night lends a weirdness to the old town with the many grey ruins, quite unusual in the north, where generally the towns have a very modern, if not altogether common, appearance under whatever condition of light one may regard them. The other northern towns are often bright and neat looking; prettily situated by some charming inland lake, and nestled amidst gardens and parks; but old Wisby, in spite of much vegetation, in spite of its beautiful Botanical Gardens sheltered by the old wall from the sea, has always about it an air of sadness. It is a town living almost solely on its memories.

OTHER TOWNS IN GOTLAND.

Illustrn. xvii.—Gothem is some twenty miles east from Wisby. Towers, nave, chancel and apse; length 92 feet, by 27 feet breadth of nave (interior measure). Date for nave and chancel with apse 1199 (?) according to records. Tower probably fifty years later. The nave is bisected, as shown in sketch which is taken from the western end, just east of the tower arch; and when looking at this arrangement I was myself inclined to doubt the correctness of the date of the nave, as regards its eastern portion; this eastern end is very much like some other naves in the island, which are known not to be older than the fifteenth century. But possibly the form may have begun early. Many of the records of these old churches are unfortunately lost. The probable reason for the curious

form of the nave is, that its present western part was intended for the tower, the walls being thicker than the rest; but that afterwards the present tower was built on to the west. The tower is very high, mutilated at top, and covered with a steep saddle roof and a small *flèche*. There are some good stalls in the chancel, and faint remains of wall-paintings.



Near the western end of this church stands the ruin of an ancient tower, probably used for defence in the early days when the churches in the island were of wood, that is in the eleventh century. Three Gothic lych-gates still remain, and not far

from the church a Gothic entrance gate to a now destroyed parsonage. Gothem is the mother-church, its annex, Norrlanda, has a very good south doorway, and some wall-paintings. Such paintings, by the way, are not unfrequently met with under the white-wash which covers so many of the ninety churches of this island. Here and there some good glass remains, but at the beginning of this present century an ever-to-be-blessed glazier in Wisby persuaded the peasants to let him insert beautiful white glass instead of the old "nasty" painted dark windows, and he is said to have profited greatly by the exchange. I should think so! A plan is here given.

Illustrn. xviii.—Stånga is about thirty English miles from Wisby. Tower, nave with column in middle, chancel, semicircular apse, 106 feet length over all, by 34 feet breadth (interior measure). Date, chancel and apse latter half of thirteenth century, nave and tower rebuilt a century later. The doorway shown in my sketch belongs to this latter date, but some suppose that the rude sculpture built into the wall at the side belonged to the older nave. Good ironwork on door, with an interesting standard ell-measure of that period.

Illustrn. xix.—Bro is a small church, about seven miles (English) from Wisby, consisting of tower, nave and chancel, 90 feet long over all, by 31 feet breadth of nave; date 1236. Tower original, nave and chancel rebuilt about the year 1400; portions of old corbel course, containing animals, men on horseback, hunting scenes, &c., built into the later walls; doorways interesting, good ironwork on doors. Alskog is a small church, about thirty-three English miles, S.E. from Wisby, tower, nave, chancel; length over all 94 feet, by 25 feet breadth of chancel; date for tower and nave 1239; nave, similar to many of the same date, has a flat wood ceiling.

Illustrn. xx.—Dalhem is about thirteen miles east of Wisby. Tower, nave and aisles, and chancel; length 108 feet by 42 feet; four columns; date, nave and chancel 1209; tower about 1270. I found amongst the fragments one of the pinnacles, and a gargoyle in the churchyard; interior much spoiled by an abominable modern organ at the west end; Gothic stalls in chancel, some painted glass, and a good Renaissance pulpit; interior, otherwise plain; roof and spire covered with boarding as usual, and of old, in the Gotland churches. Bäl is about fourteen miles north-east of Wisby. Small plain church, built 1246,

south doorway later; tower, nave and chancel; length 62 feet, by 26 feet breadth. Found some ancient wooden images (since removed) in the tower, and fragments of old furniture; two ancient lych-gates open to the churchyard. A decayed old alms-box by the road; rather picturesque little spire.

Illustrn. xxi.—Garde is some thirty-three miles from Wisby. Tower, nave and chancel; length over all 83 feet, breadth of chancel 26 feet; date for tower and nave, 1200; but the chancel is at least 200 years later. The nave has a flat wooden ceiling, not original, but probably similar to the old one, unless there was an open roof, which may have been the case, as some of the rafters are chamfered. This church affords one of the many examples of the rebuilding of the chancel, and in this case they preserved a most interesting mural painting on the tower-arch, representing two saints of pure Byzantine character. The churchyard has four good lych-gates, and there is an ancient Gothic entrance gate to the parsonage. The old interesting parsonage was unfortunately destroyed some years ago. Most of the churches are built of a very hard limestone, both as to the dressed work and body of the walls, the latter being sometimes plastered. The older churches are sometimes all ashlar. In the southern part of the island, sandstone is largely used, of a very good quality.

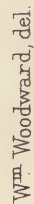
Illustrn. xxii.—Font in the church of Barlingbo. One of the numerous sandstone fonts existing in country churches in Gotland. They are mostly of this early character, and are contemporary with the oldest part of the churches, though not always of as rude workmanship as this one. The church of Barlingbo is said to date from the year 1200; 68 feet long over all, nave 27 feet wide (interior measure). About eight English miles south-east from Wisby.

Illustrn. xxiii.—Mästerby Church is some fourteen miles south of Wisby. Tower, nave, chancel and apse; length over all 78 feet, by 22 feet breadth of nave, internally. This little church is chiefly interesting from its wall-painting on the apse, apparently not much later than the church itself, which seems to have been erected some time about 1250. It represents a figure of Christ in Glory with angels, the evangelistic symbols, the evangelists themselves, the apostles and kings, and the prophets; beneath, Paradise, or the Creation, partly covered with whitewash. The painting is fairly well preserved; the colours are red, blue, green, brown and white. The church possesses a font of very early character. There is some good glass in the eastern of the two nave windows, representing a figure of Christ and the evangelistic beasts. The architecture of the church is very plain in character, and the tower disproportionally high, of the ordinary North German type, with four gables and spire.

Illustrn. xxiv.—Ganthem Church is some fifteen miles east of Wisby. Tower, nave, chancel and apse; one column in nave; length over all 66 feet, by 24 feet breadth of nave. It appears that this church was built about the year 1200. It possesses some mural paintings, partly shown in my sketch; they were there in 1872, and I hope they are there now, and they are not without interest. The stations of the cross are shown in ten pictures, eight of which appear on the north wall of the nave and the two others on the east wall. Under a painted drapery is a vesica with our Lord in Glory. There are

paintings also in other parts of the church, all of the same date, namely, the middle of the fifteenth century. The drawing is somewhat rude, but the colours are well preserved. In all likelihood there is an older painting underneath this. There is a late Gothic triptych and predella, upon an old stone altar-table; and a good very early font of sandstone; also a curious oaken alms-box. I do not remember whether there are many tombstones in this church, but in many other churches of the island they are very numerous, the runic inscriptions being occasionally used as late as the fifteenth century. The Gothic letters on some stones are often very good indeed. The large crucifix in Ganthem is very old and somewhat rude; there are some better ones in the island. I do not think there was any painted glass left in this church; but in one or two country churches such glass still remains, very good indeed, and fragments, here and there, are of very early character. The best in the island is from the beginning of the fourteenth century. How these things, as well as paintings, came to be used in churches which now lie in poor and little inhabited parts of the country, in almost desert places in fact, is now a wonder to us. The old records are lost, even tradition is mute, and few of the peasants, and in fact rarely the schoolmasters and clergy themselves seem to care to enquire what all these old paintings, either on the walls or in the windows, mean. It is only through the enlightenment of a few enthusiastic men in Wisby, and their most praiseworthy endeavours, that the state of things has come under Government notice, and a spirit of preservation has stepped in where formerly absolute indifference reigned. There was, at the end of the last and the beginning of this century, here as elsewhere, a rage for painting the churches white all over, and many remarkable paintings were thus lost. Indeed, the interiors of these churches are often so poor and bare, that now there appears to be an absolute necessity for paintings; the want of colour seems to have been felt from the very first here, where such a good opportunity for it is offered by the great bare expanse of wall-space on the north side, and the paintings would not be injured by damp, the walls being, in many instances, as much as four or five feet thick. It is fortunate that, in some instances, the whitewash peels off readily, so that here and there the old paintings have been again brought out; but the want of care in the work of removing the plaster has also caused much damage. A new spirit and a respect for these things is beginning to be cultivated amongst the younger generation of the country people, who, by means of excellent schools, are becoming very fairly intelligent. In the subject before us, much depends naturally on the clergy, who have certainly not in this respect, and in the island of Gotland particularly, quite understood their responsibility.

A. H. HAIG.



SIR CHRIS^R. WREN'S PLAN FOR REBUILDING LONDON.

C F Ken Ltd, 8 Castie St, Holborn, London E C



Existing buildings are shown thus
Plots to be let by tender in May 1884 thus ..
A.A.A. Sites for Artizans Dwellings



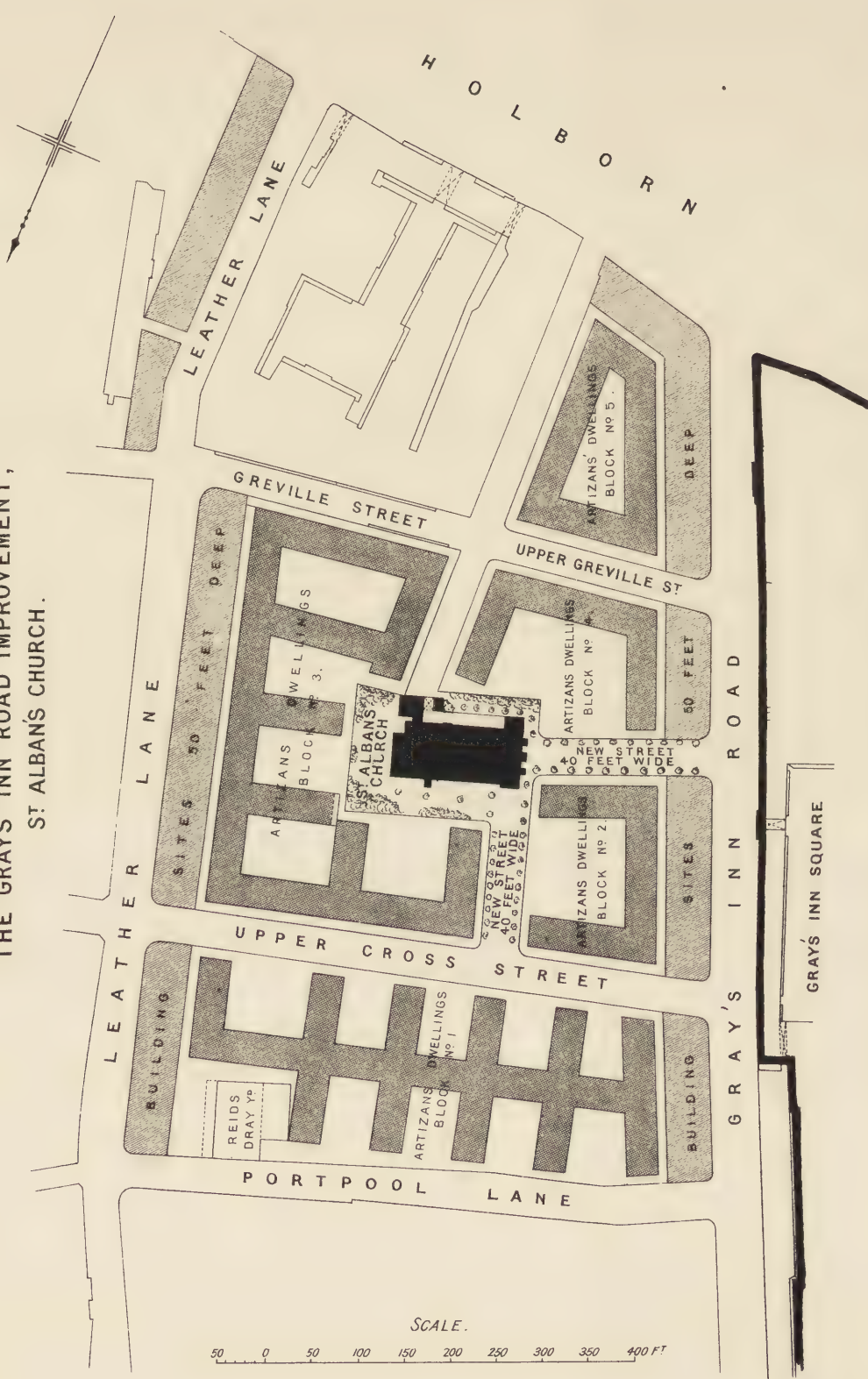
THE GRAY'S INN ROAD IMPROVEMENT,
 AS LAID OUT BY THE METROPOLITAN BOARD OF WORKS.
 MAY, 1884.

Wm Woodward, del.

C.F. Keil Lith 8 Castle St. Holborn London, E.C.



THE GRAYS INN ROAD IMPROVEMENT,
ST ALBAN'S CHURCH.

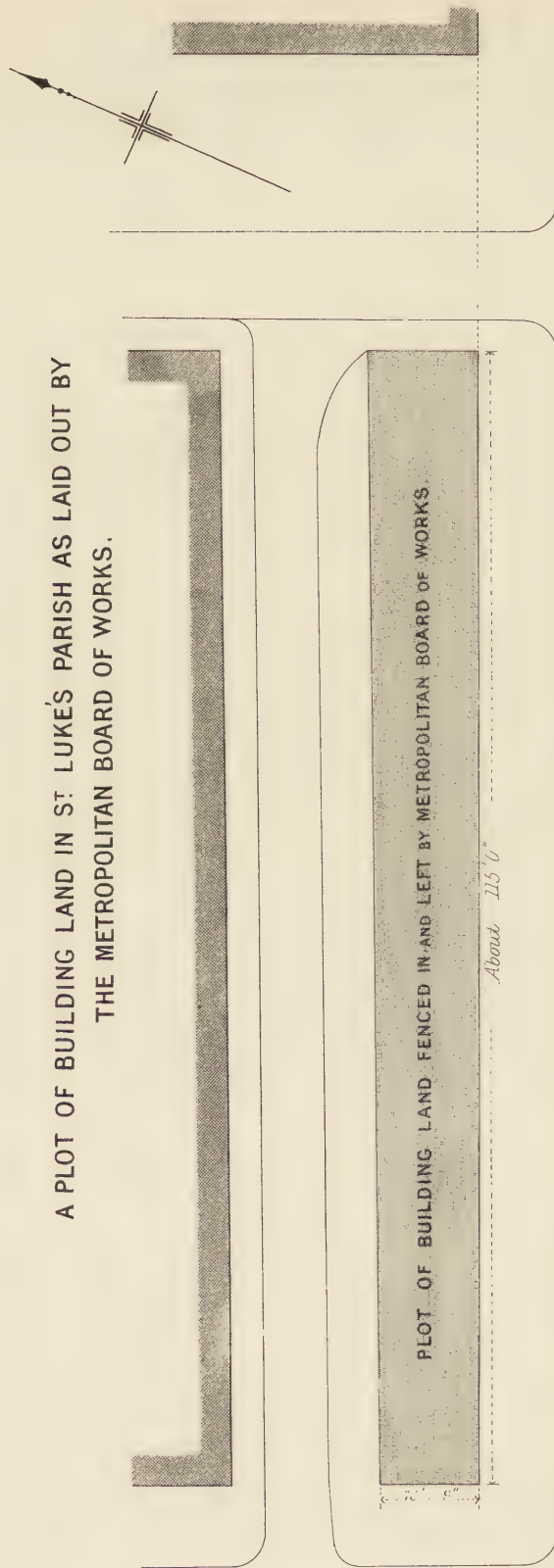


PLAN SUGGESTED BY MR. LEWIS H. ISAACS,

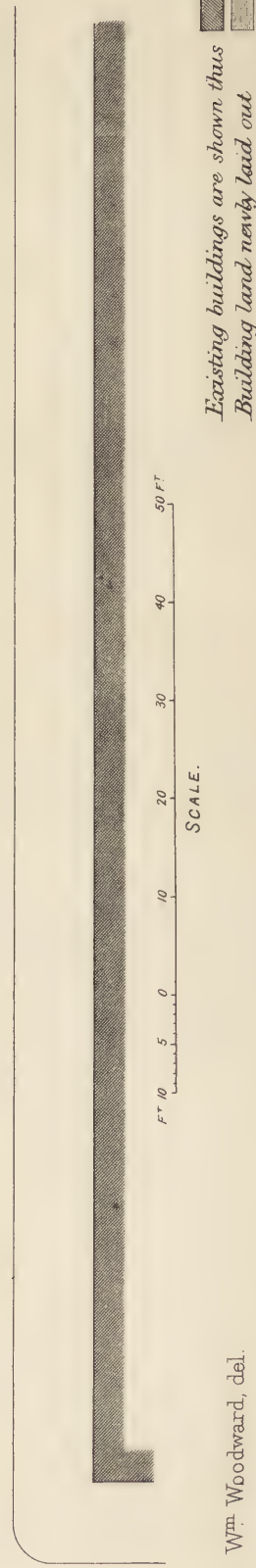
Wm. Woodward, del.

C.F. Keil Lith 8 Castle St. Holborn London, E.C.

A PLOT OF BUILDING LAND IN ST LUKE'S PARISH AS LAID OUT BY
THE METROPOLITAN BOARD OF WORKS.



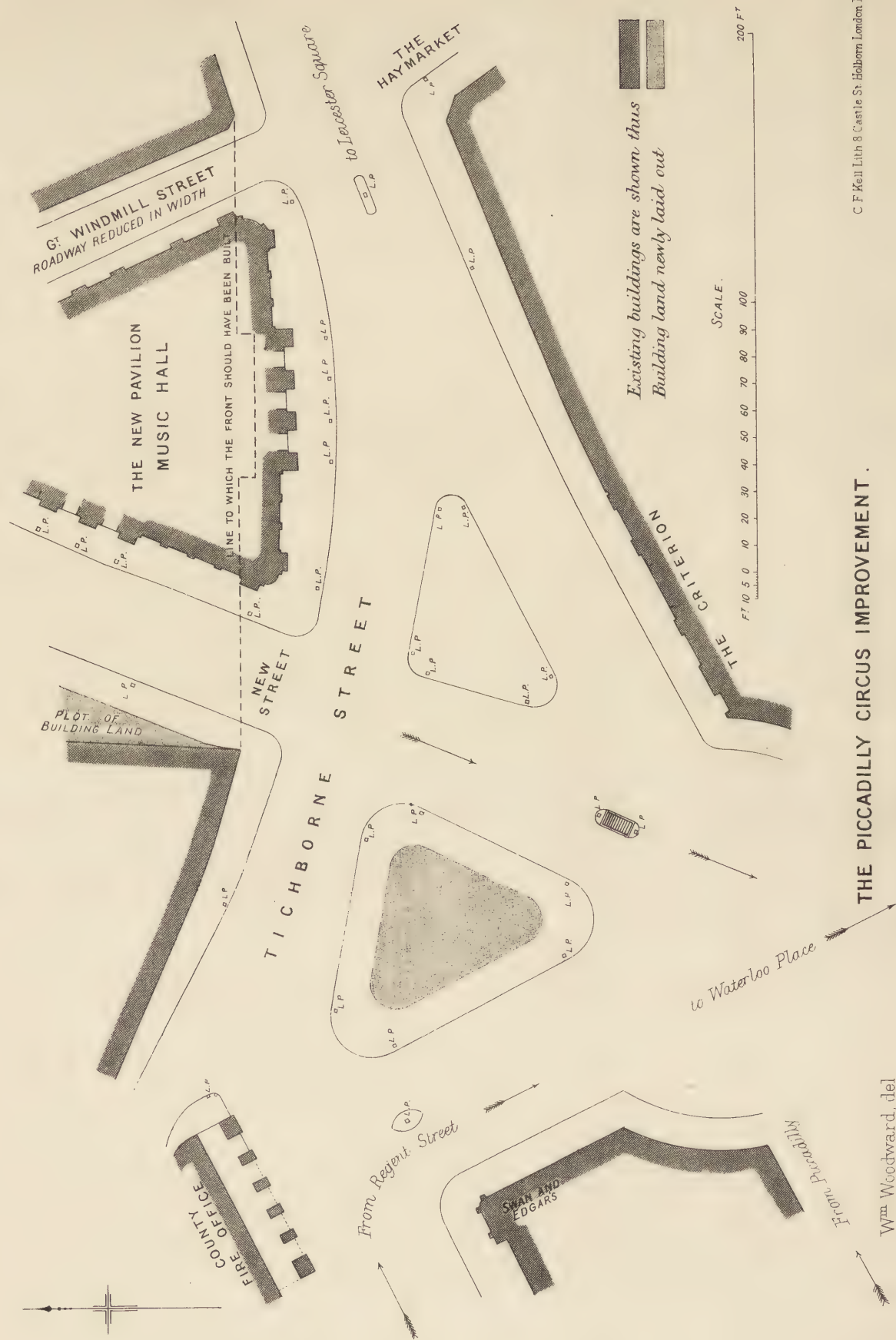
R O S C O E S T R E E T (S T L U K E ' S)



Existing buildings are shown thus
Building land newly laid out

Wm Woodward, del.

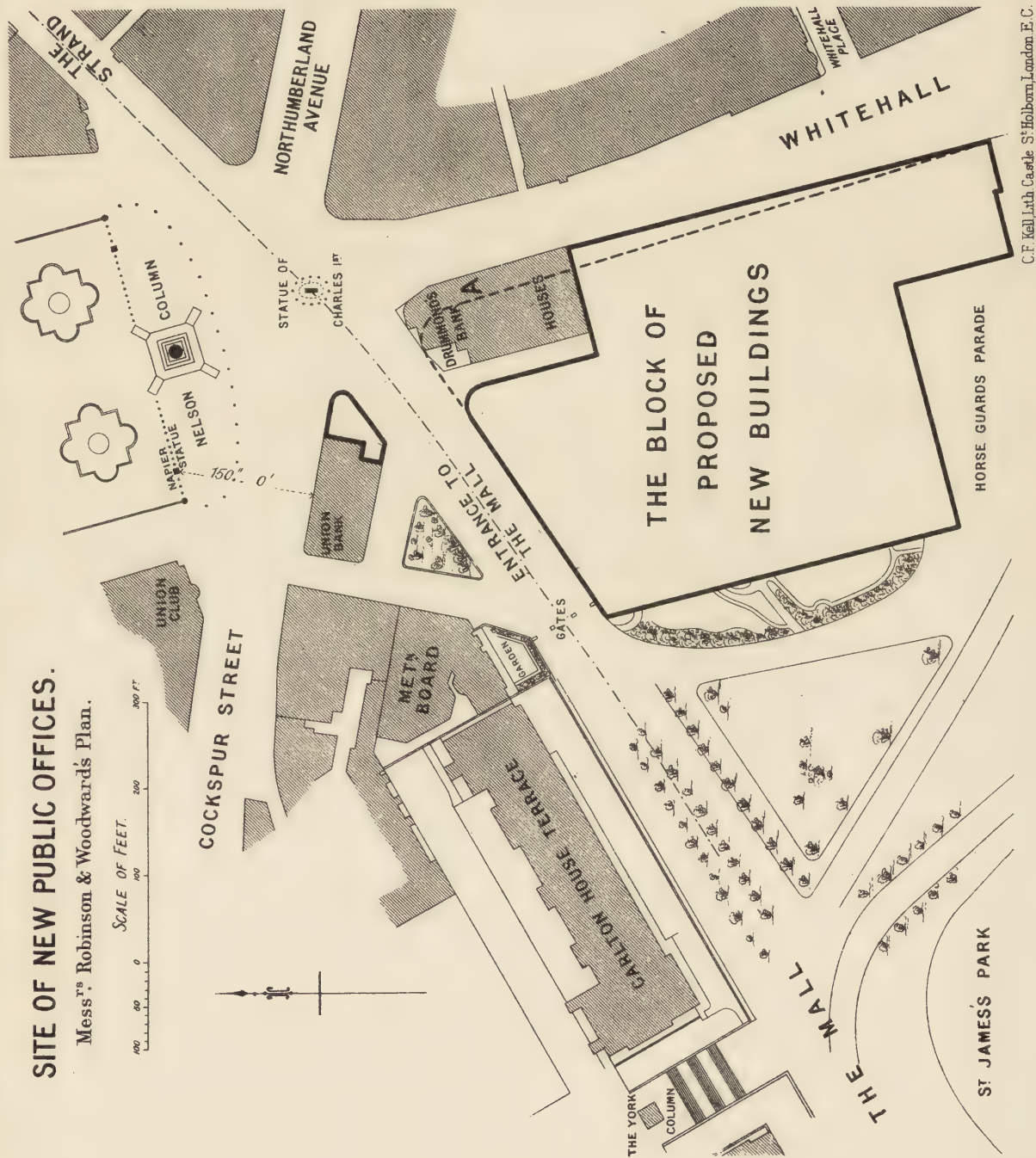






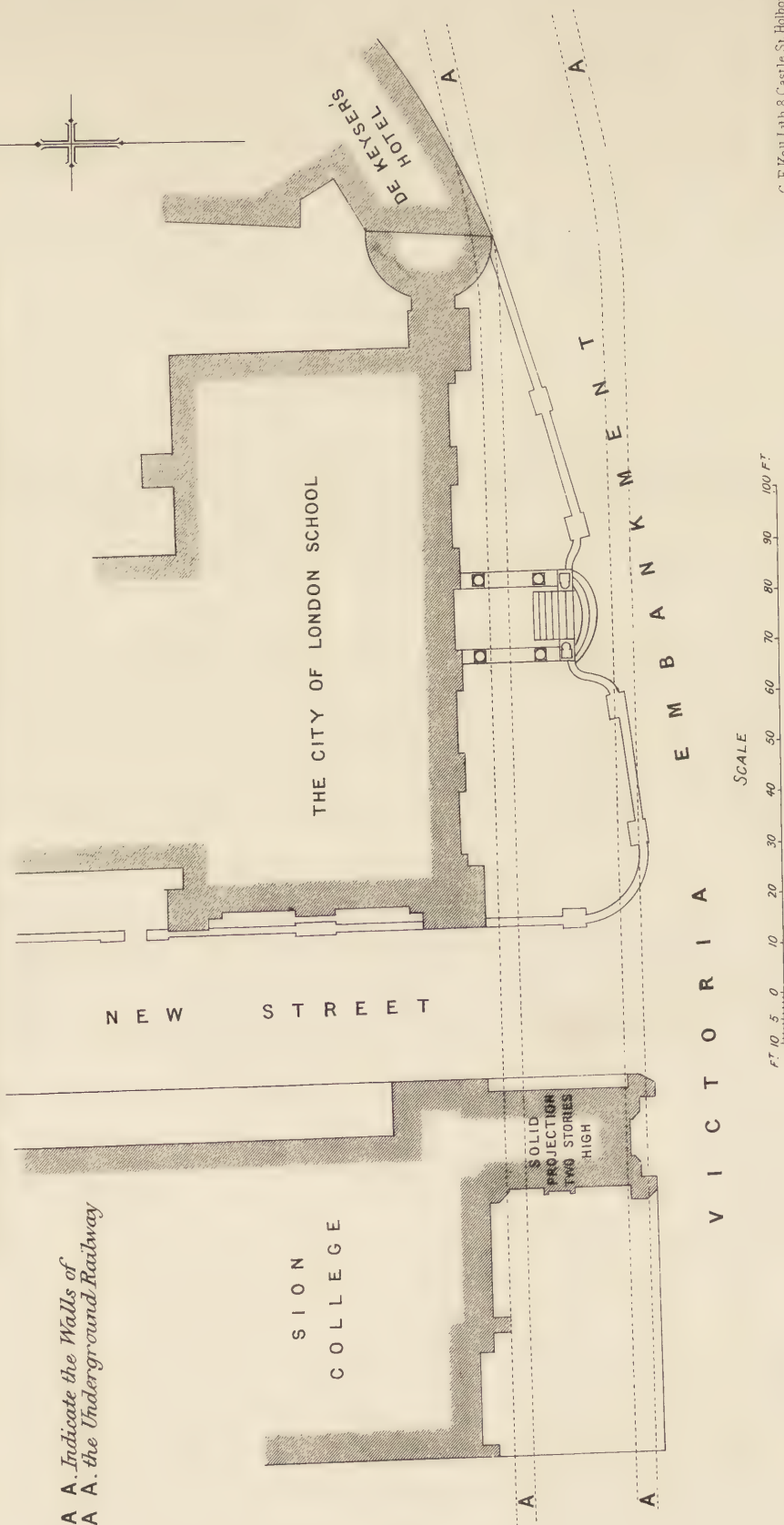
SITE OF NEW PUBLIC OFFICES.

Mess^{rs} Robinson & Woodward's Plan.





LINES OF FRONTAGE
AS REGULATED BY THE CORPORATION AND THE METROPOLITAN BOARD OF WORKS.

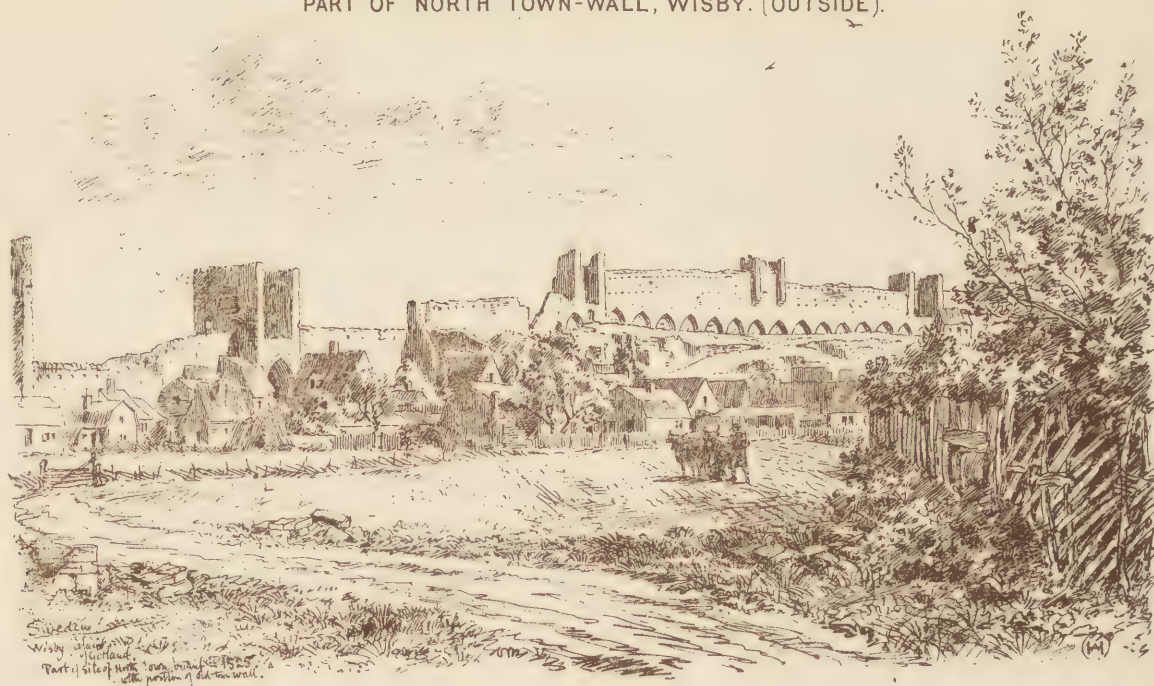


Wm Woodward, del.





PART OF NORTH TOWN-WALL, WISBY. (OUTSIDE).

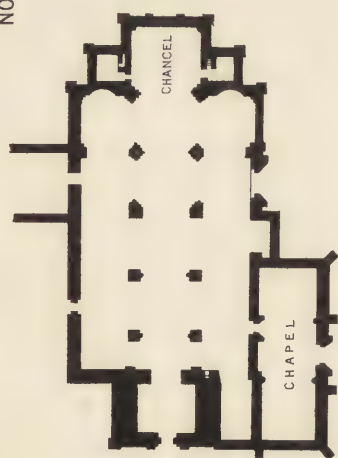


PART OF NORTH TOWN-WALL, WISBY. (INSIDE).

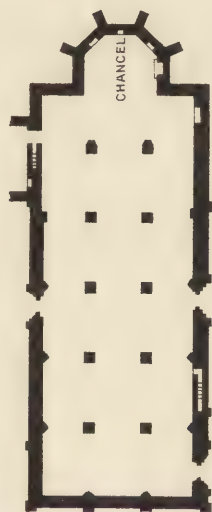


XIV. WISBY IN GOTLAND (IX).

NOTE. THE FIGURES REFER TO THE NUMBERS GIVEN IN MR. WHITE'S PAPER.



1. CATHEDRAL CHURCH OF ST. MARY.
SEE ILLUSTRATIONS X, XI, XII.



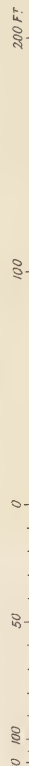
2. ST. NICHOLAS.
SEE ILLUSTRATION XIII.



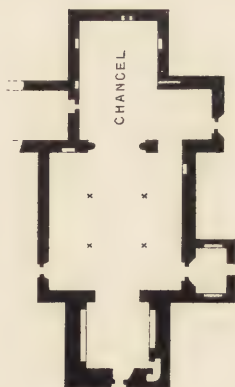
3. ST. GERTRUDE.



4. HELGE-ANDS KYRKAN.
(CHURCH OF THE HOLY GHOST)
SEE ILLUSTRATION XIV.

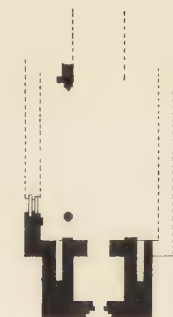


SCALE.

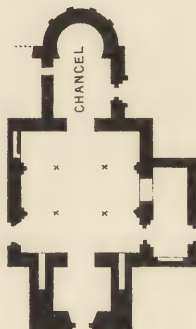


5. ST. KLEMENS.

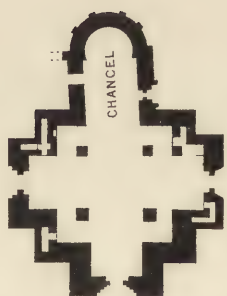
THE XXX SHOWN IN THE PLANS OF ST. KLEMENS AND ST. DROTTEW MARK THE POSITION OF COLUMNS NOW DESTROYED.



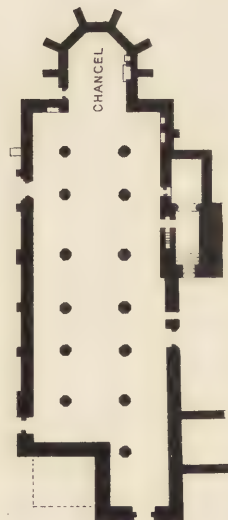
6. ST. OLOF.



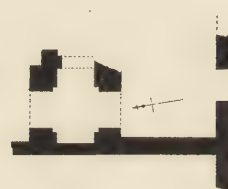
7. ST. DROTTEW.
(SO-CALLED SISTER CHURCHES.)



8. ST. LARS.



9. ST. KATHERINE.
SEE ILLUSTRATION XV.



10. ST. HANS.



11. ST. GÖRAN (OUTSIDE THE WALLS)
SEE ILLUSTRATION XVI.

Sir H. Dryden, Bart., del.

PLANS OF CHURCHES AT WISBY.

E. Keil lith. & Castle St. Holborn London E.C.



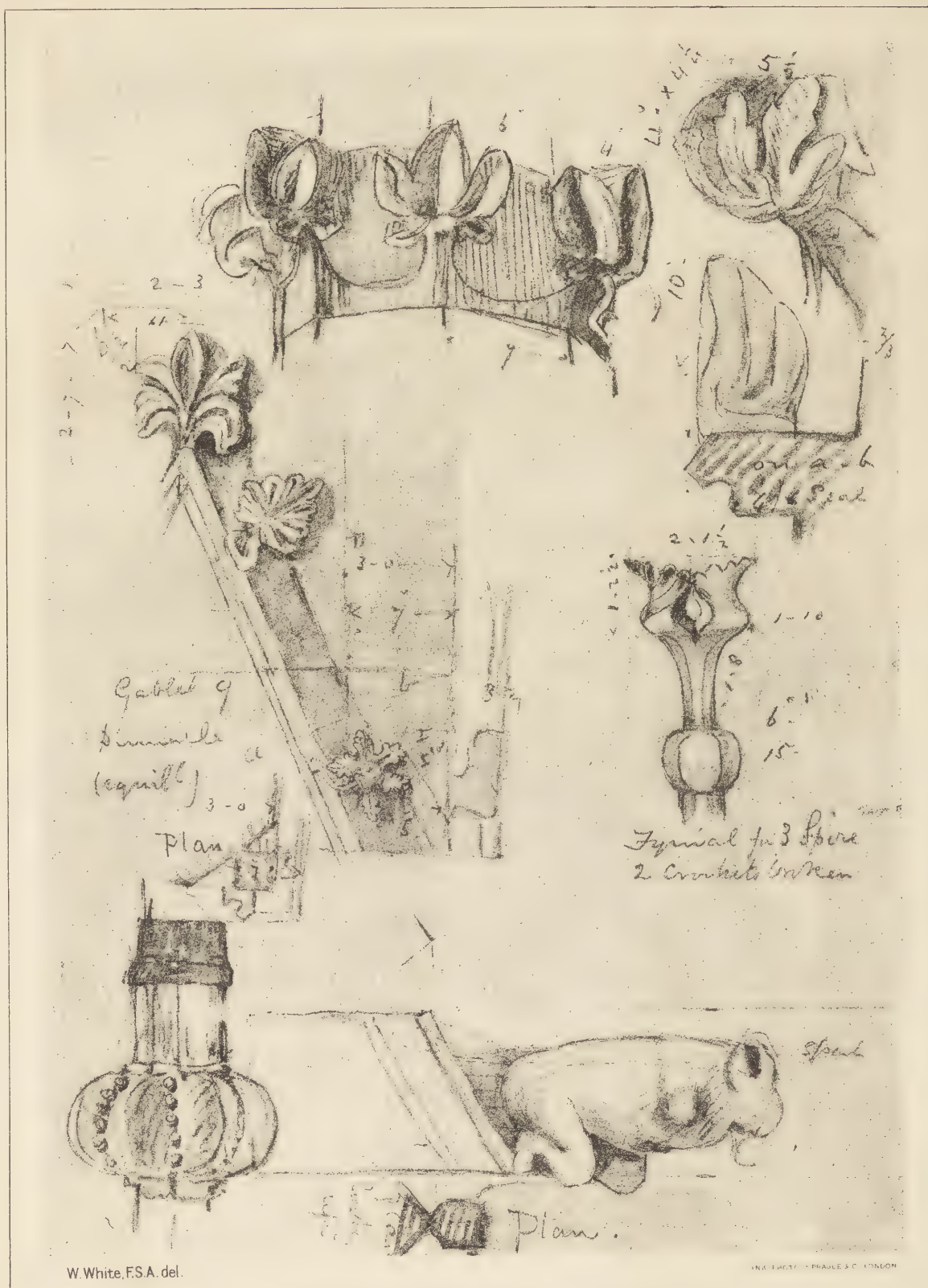
XIV. WISBY IN GOTLAND. (X).



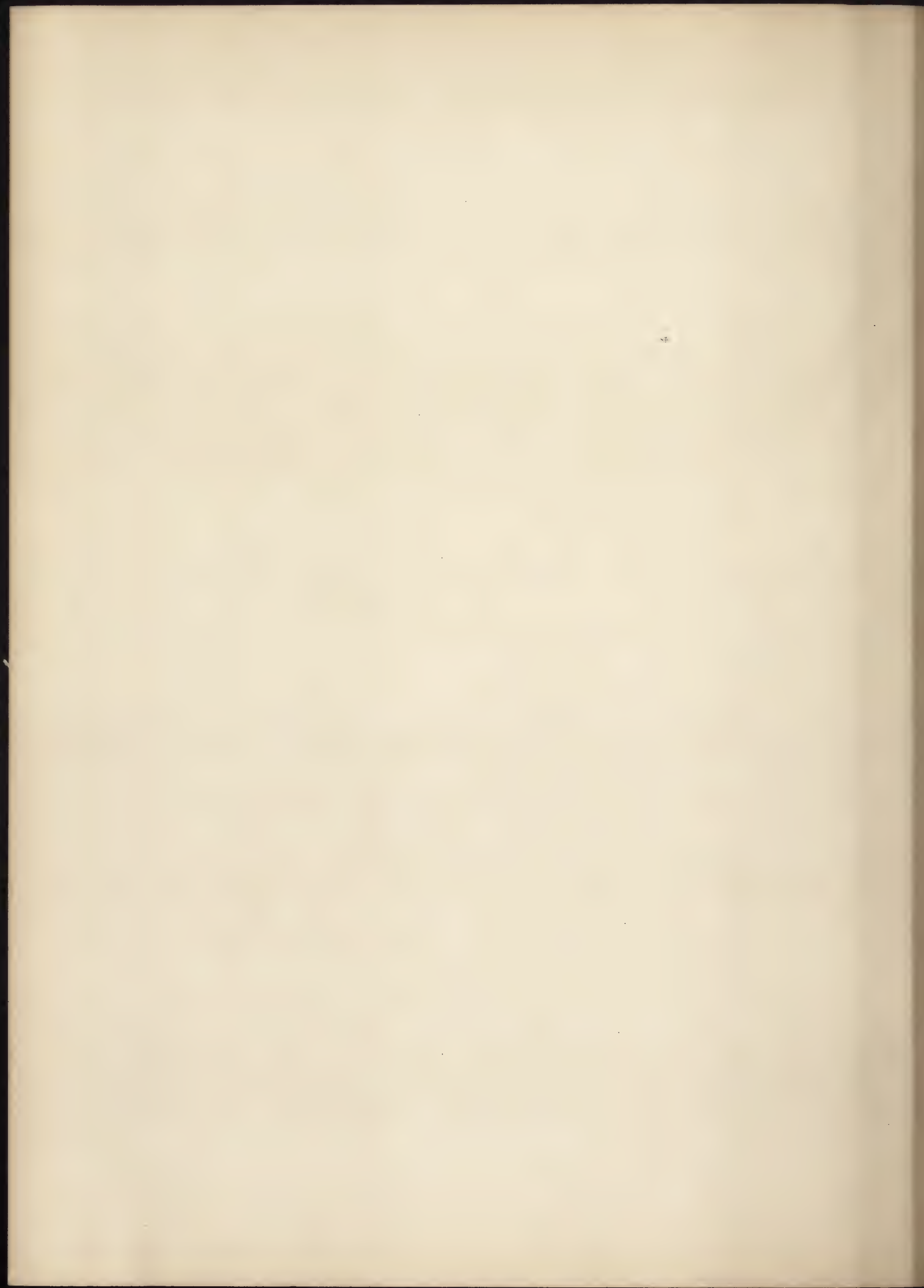
G E Carpenter.

MARKET PLACE AND CATHEDRAL, WISBY.
FROM A PHOTOGRAPH TAKEN IN 1883.





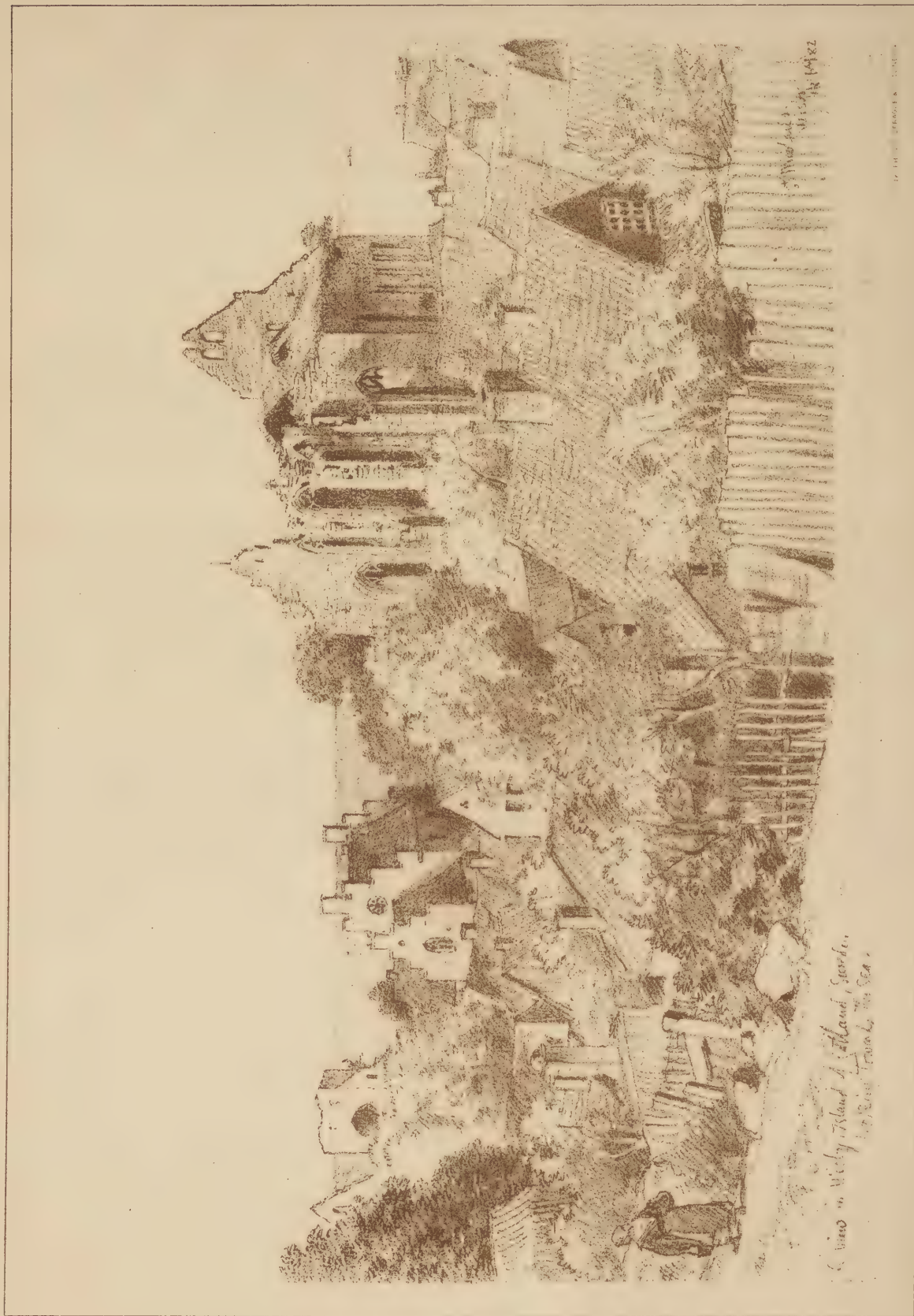
SKETCHES AT THE CATHEDRAL, WISBY.





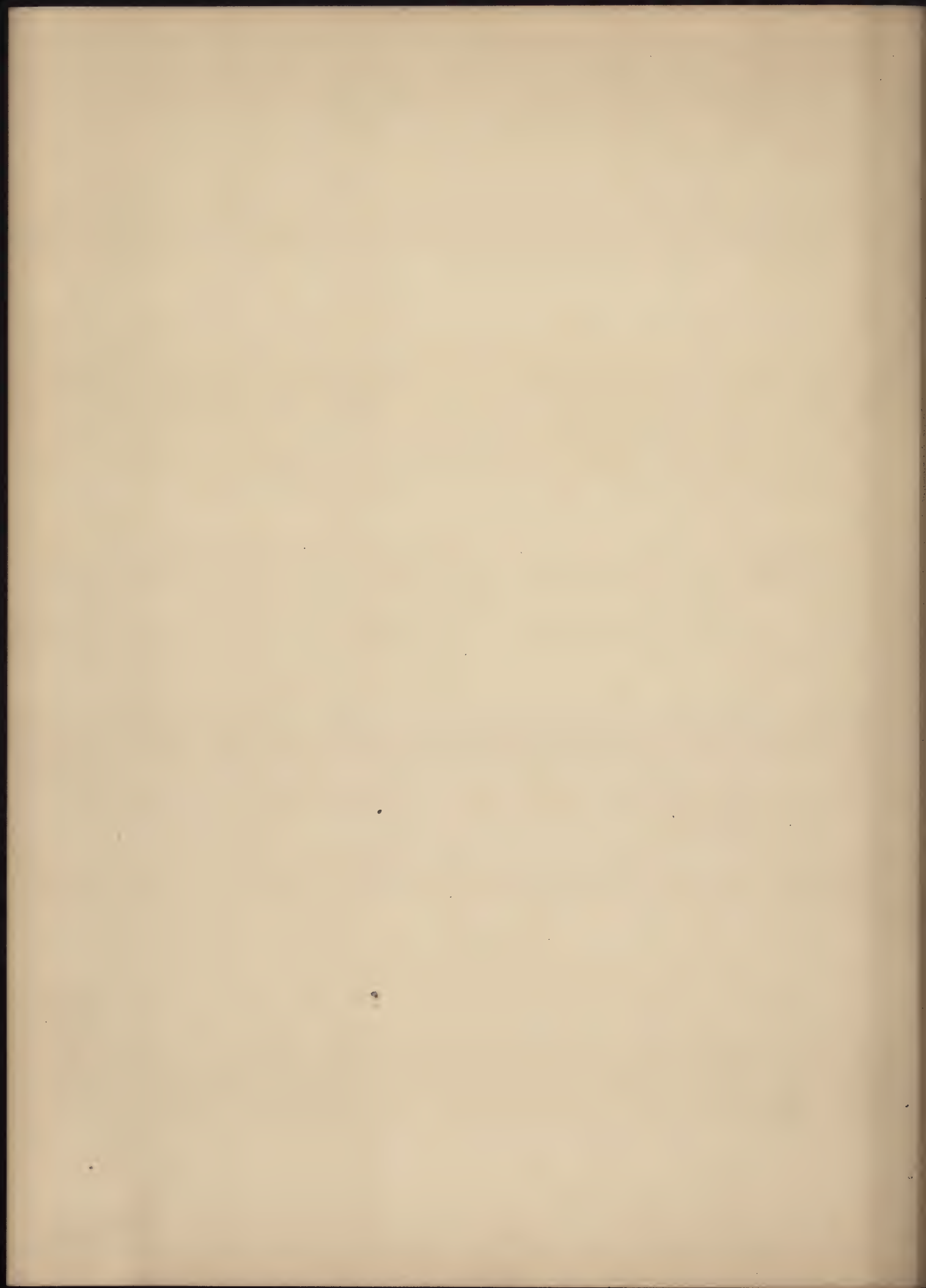
SKETCHES AT THE CATHEDRAL, WISBY.

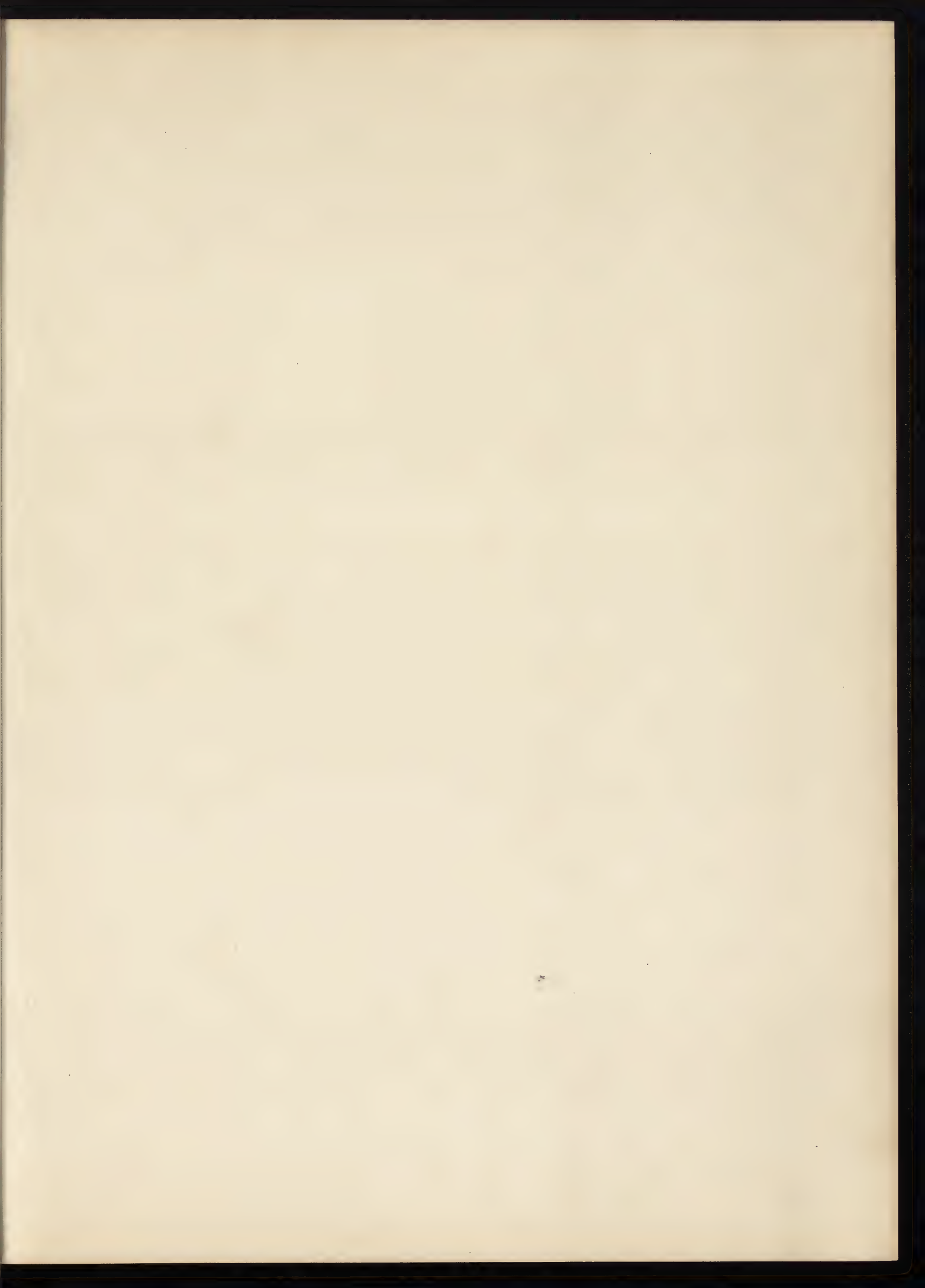




A. H. Haig del.

RUINS OF ST. NICHOLAS, WISBY.

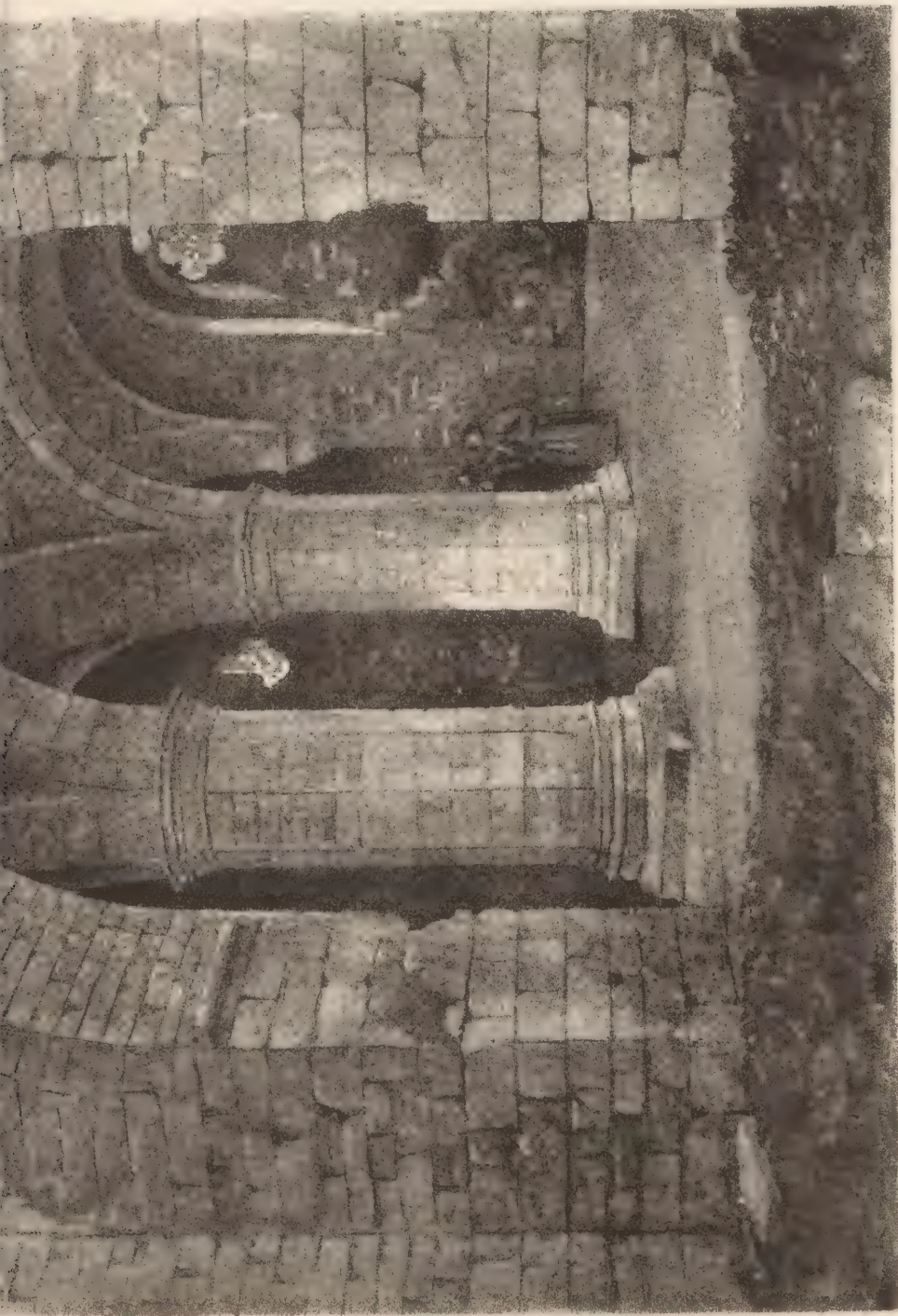




TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL. II. NEW SERIES.

XIV WISBY IN GOTLAND (XIV).





A. H. Haig, del.

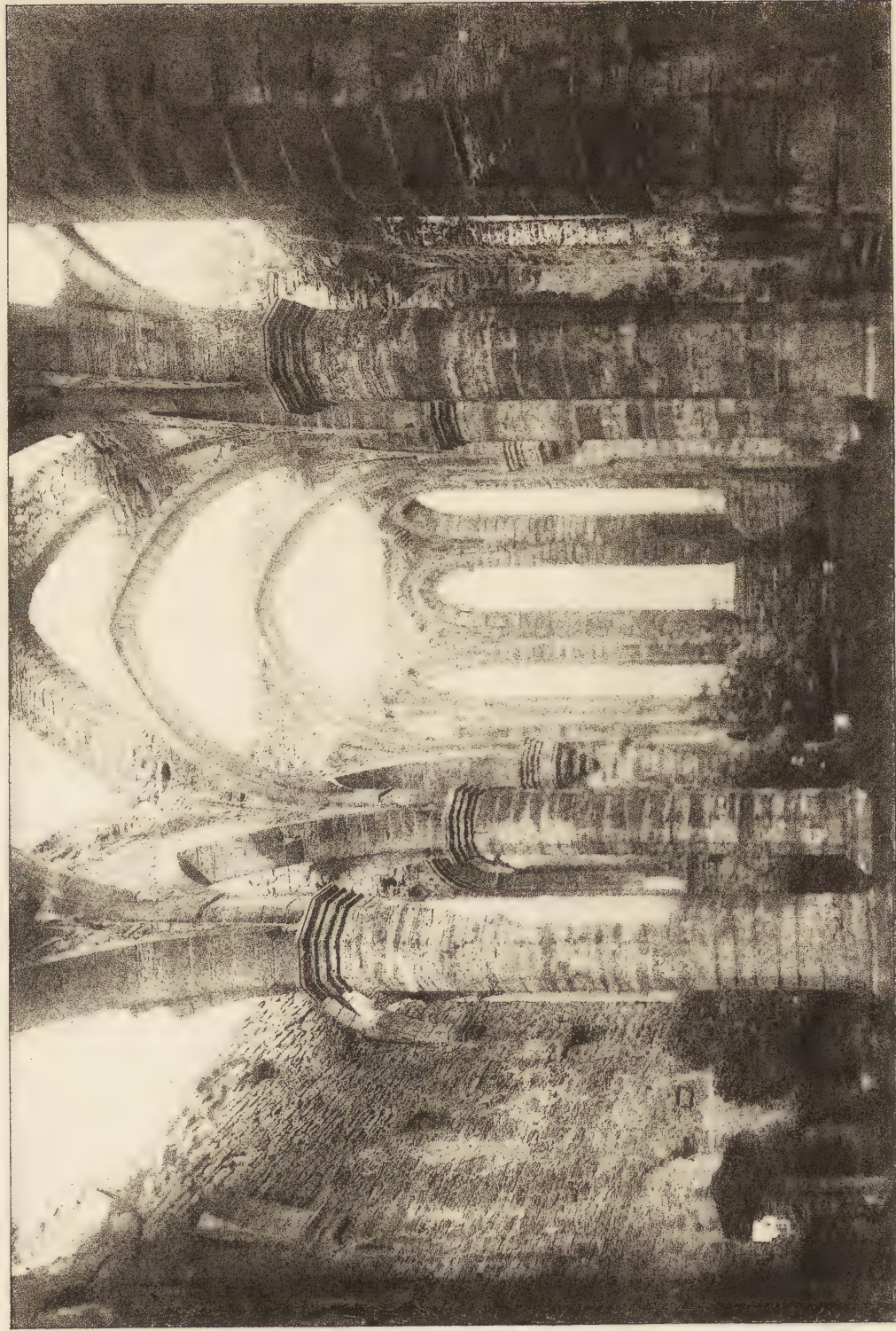
INK PHOTO SPRACUE & CO LONDON

CHURCH OF THE HOLY GHOST (HELGE AND'S KYRKAN), WISBY.

VIEW FROM THE CHANCEL.

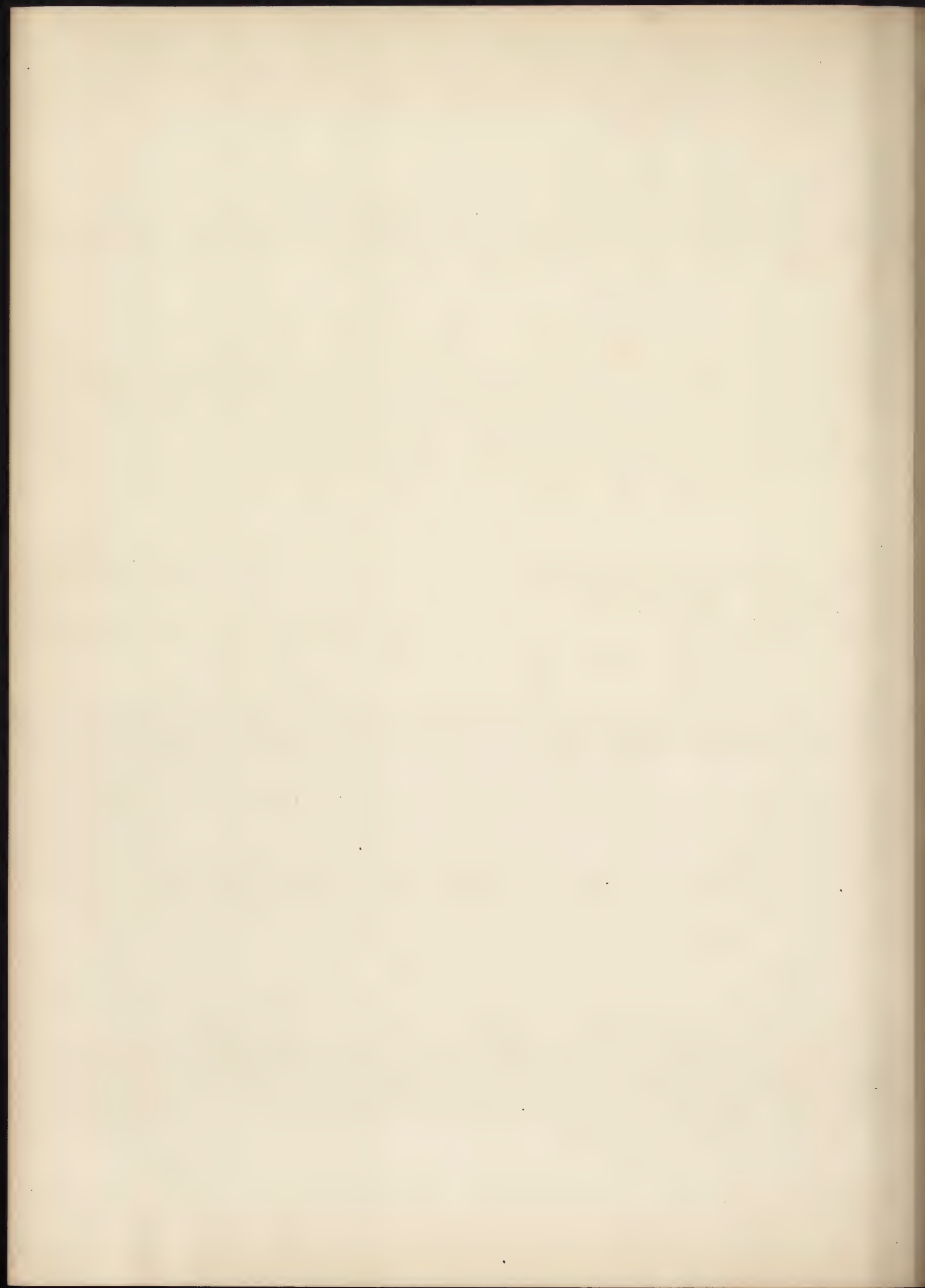


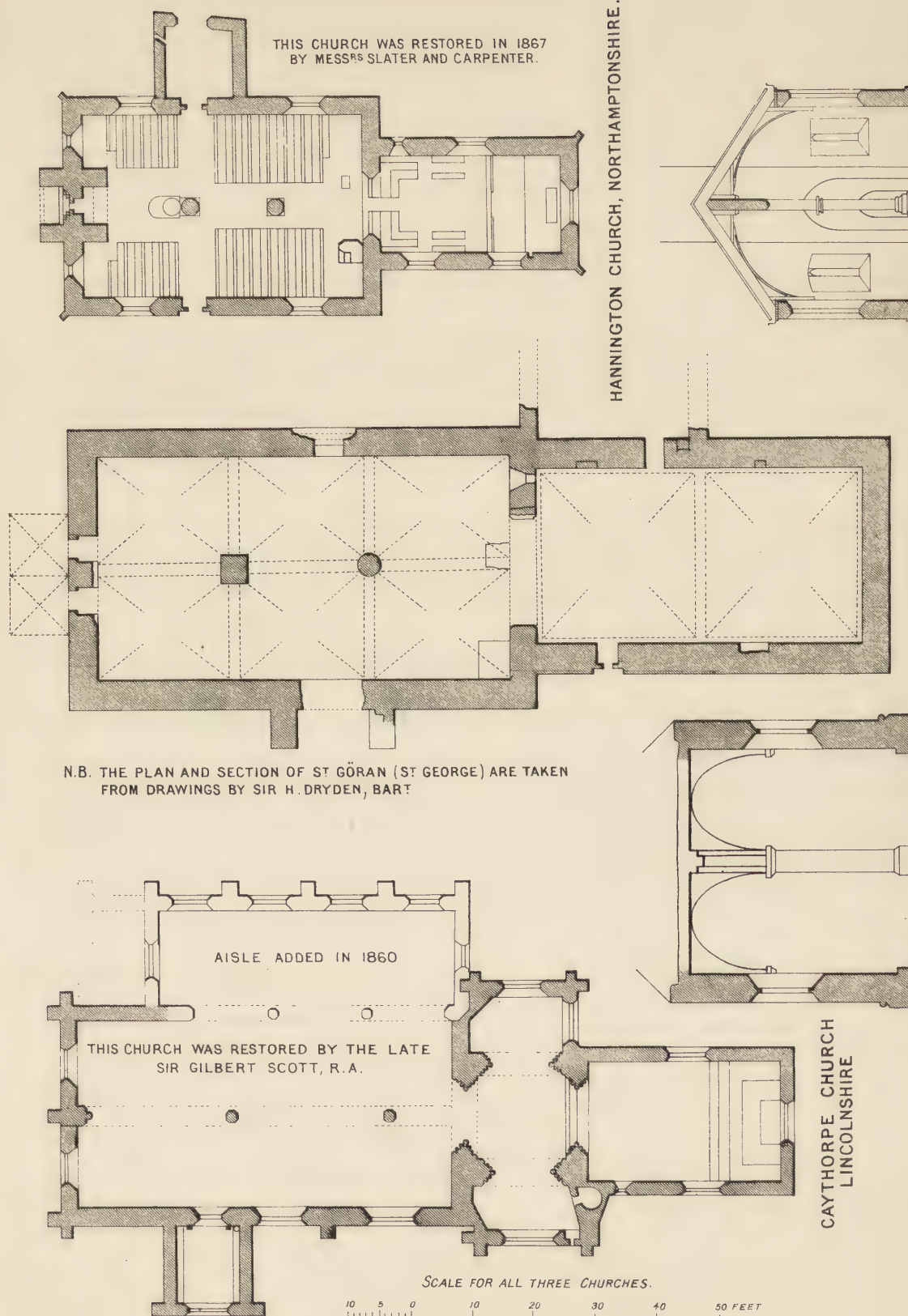
XIV. WISBY IN GOTLAND. (XV).



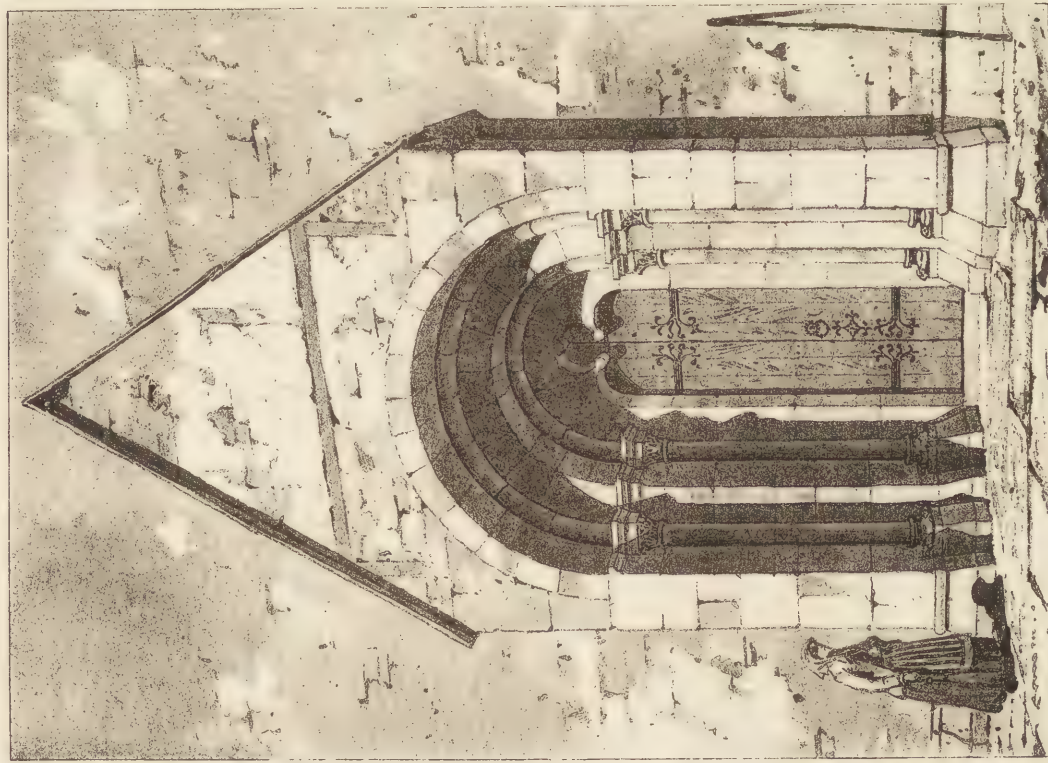
H. Jarvis, jun.

RUINS OF ST. KATHERINE, WISBY.
FROM A PHOTOGRAPH TAKEN IN 1883.



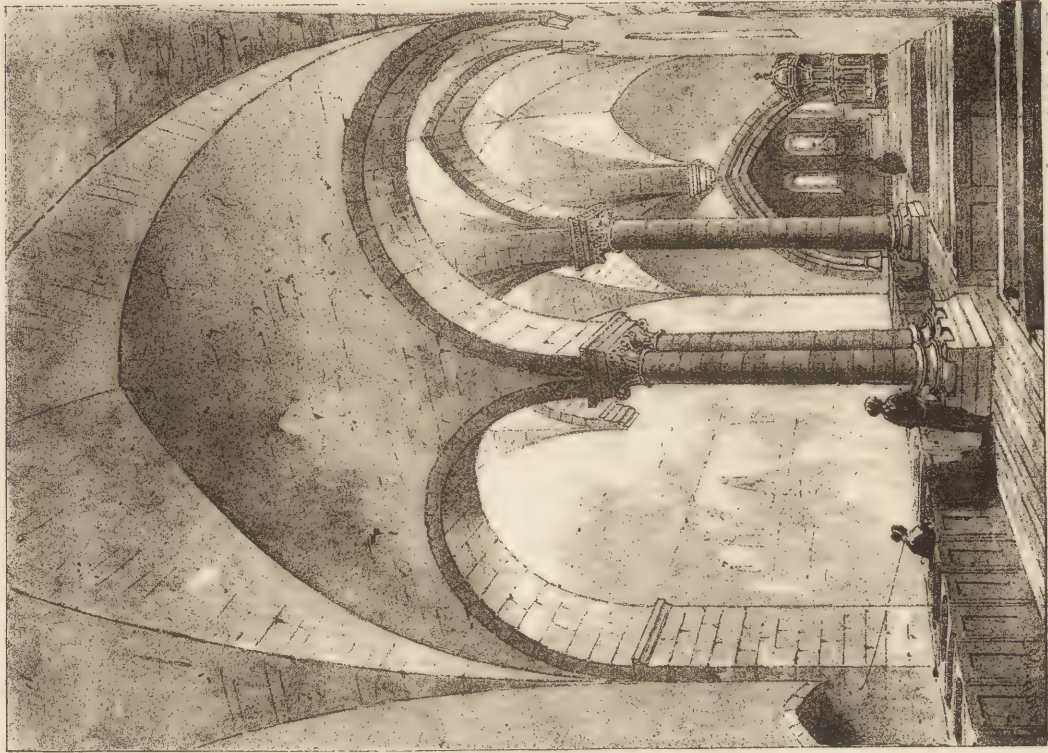






A.H. Haig del

SOUTH-WEST DOORWAY.



A.H. Haig del

INTERIOR LOOKING EAST.

GOTHEM CHURCH, GOTLAND.

INV. PHOTO. SPRAGUE & C. LONDON.

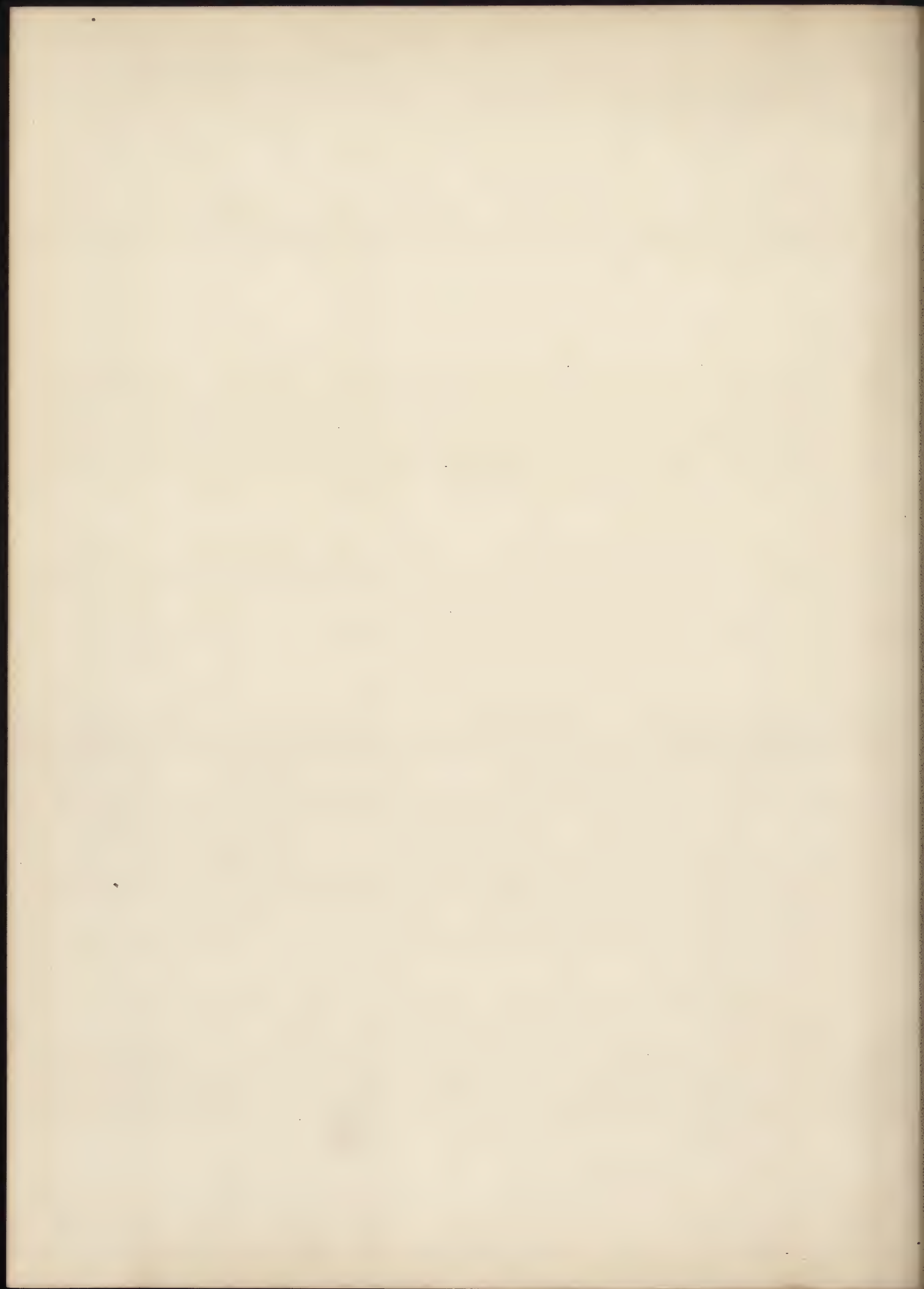




A.H. Haig, del.

C.F. Kell, Photo-Litho. Castle St. Holborn, London, E.C.

STÅNGA CHURCH, ABOUT 30 MILES FROM WISBY.





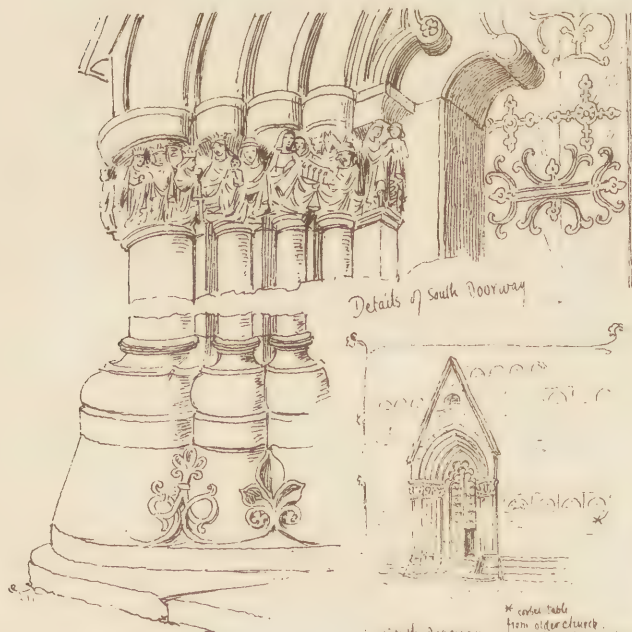
Bro church, Gotland, Sweden.
old gateway to what was probably a clergy house.

BRO CHURCH.



Alskog Ch. Gotland, Sweden.

ALSKOG CHURCH



Details of South Doorway



South Doorway

the entire table
from older church
inserted in the wall

Bro church, Gotland, Sweden.

DETAILS AT BRO CHURCH.



1874

door to have
Alskog Ch. Gotland, Sweden.

DOOR AT ALSKOG CHURCH.

COUNTRY CHURCHES ABOUT 30 MILES FROM WISBY.





DALHEM CHURCH.

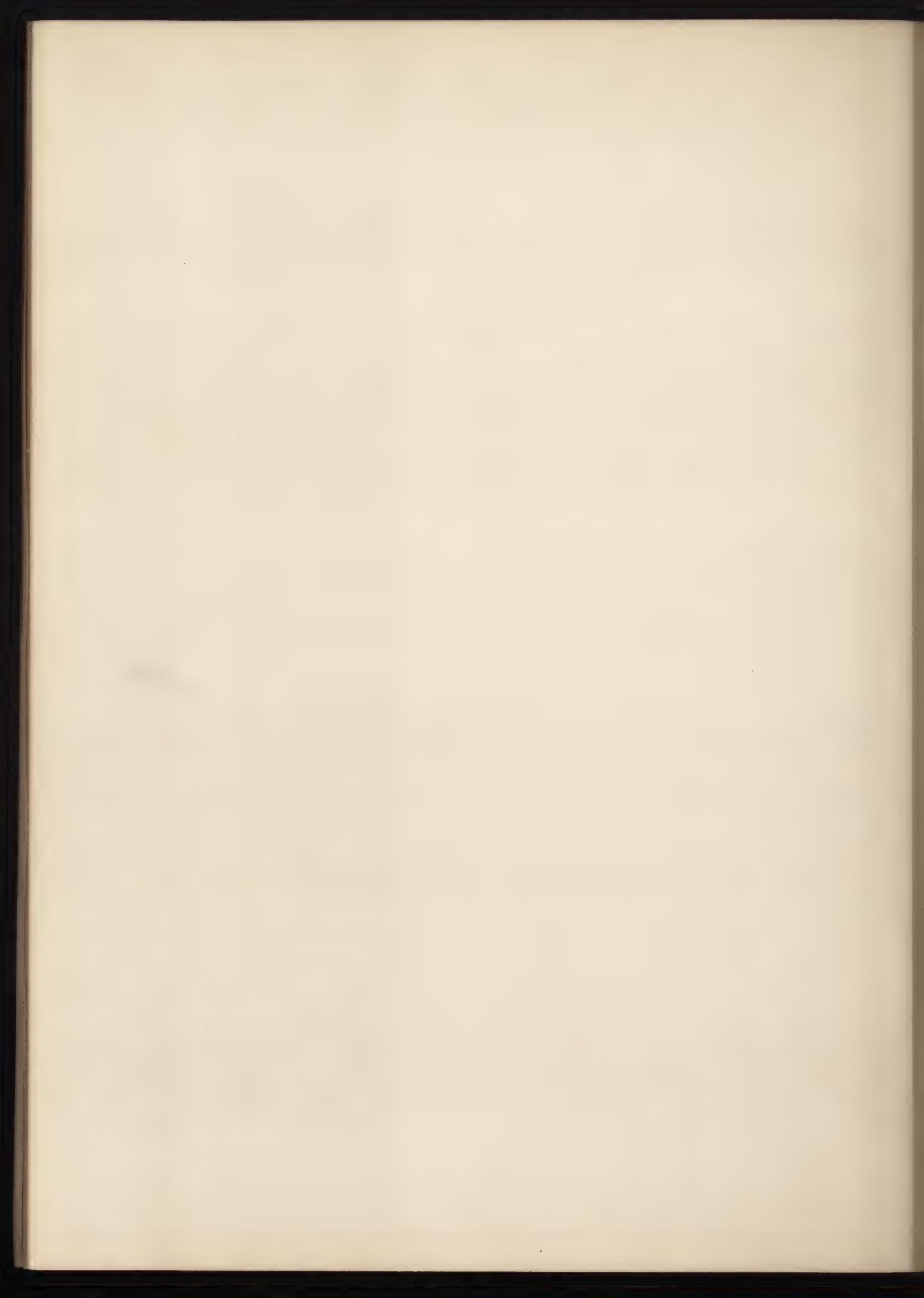
A.H. Haig, del.



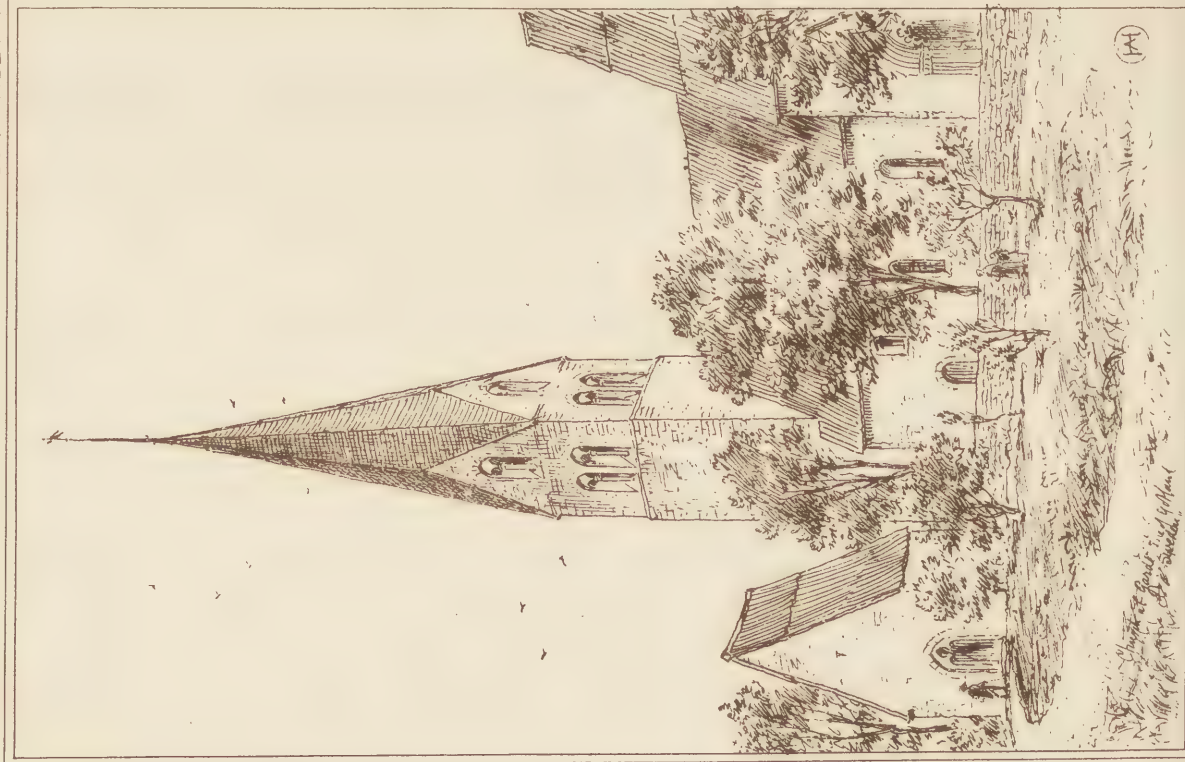
BÄL CHURCH.

COUNTRY CHURCHES ABOUT 14 MILES FROM WISBY.

C.E. Keil, Photo. Litho. and Engr. of the original designs.

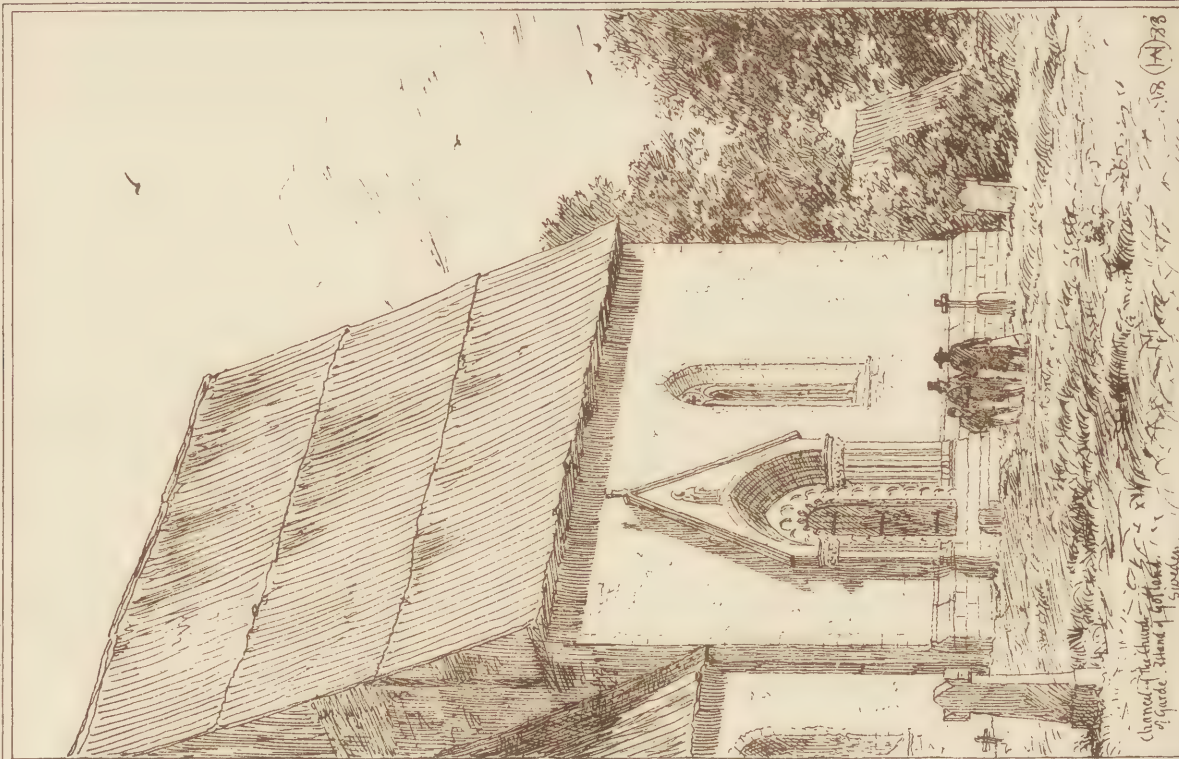


XIV. WISBY IN GOTLAND (XXI).



A.H. Haug del.

GARDE CHURCH, ABOUT 33 MILES FROM WISBY.



C.F. Keil. Photo. Lith. Castle St. Helborn, London, E.C.





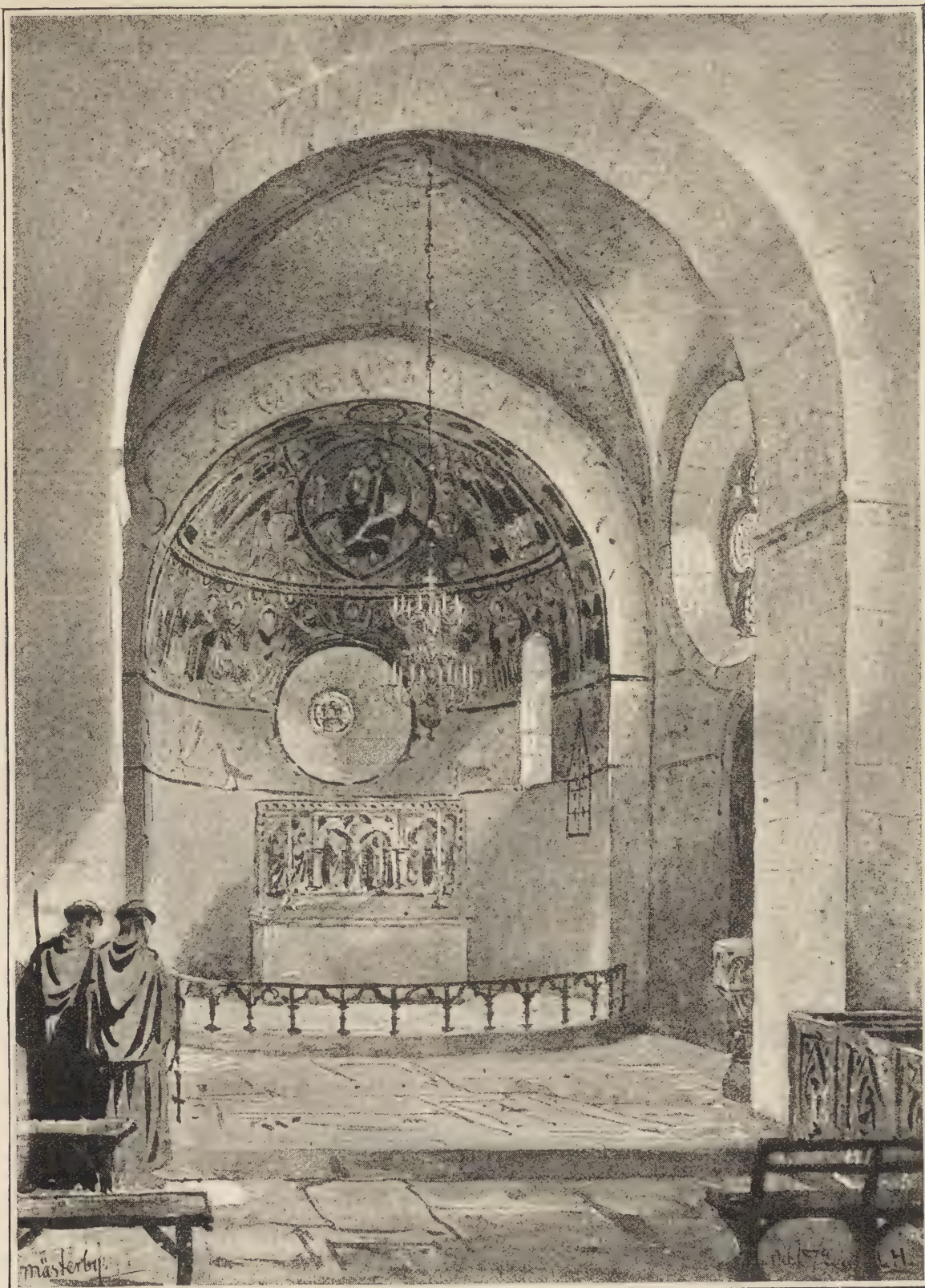
FONT IN BARLINGBO CHURCH, 8 MILES FROM WISBY.



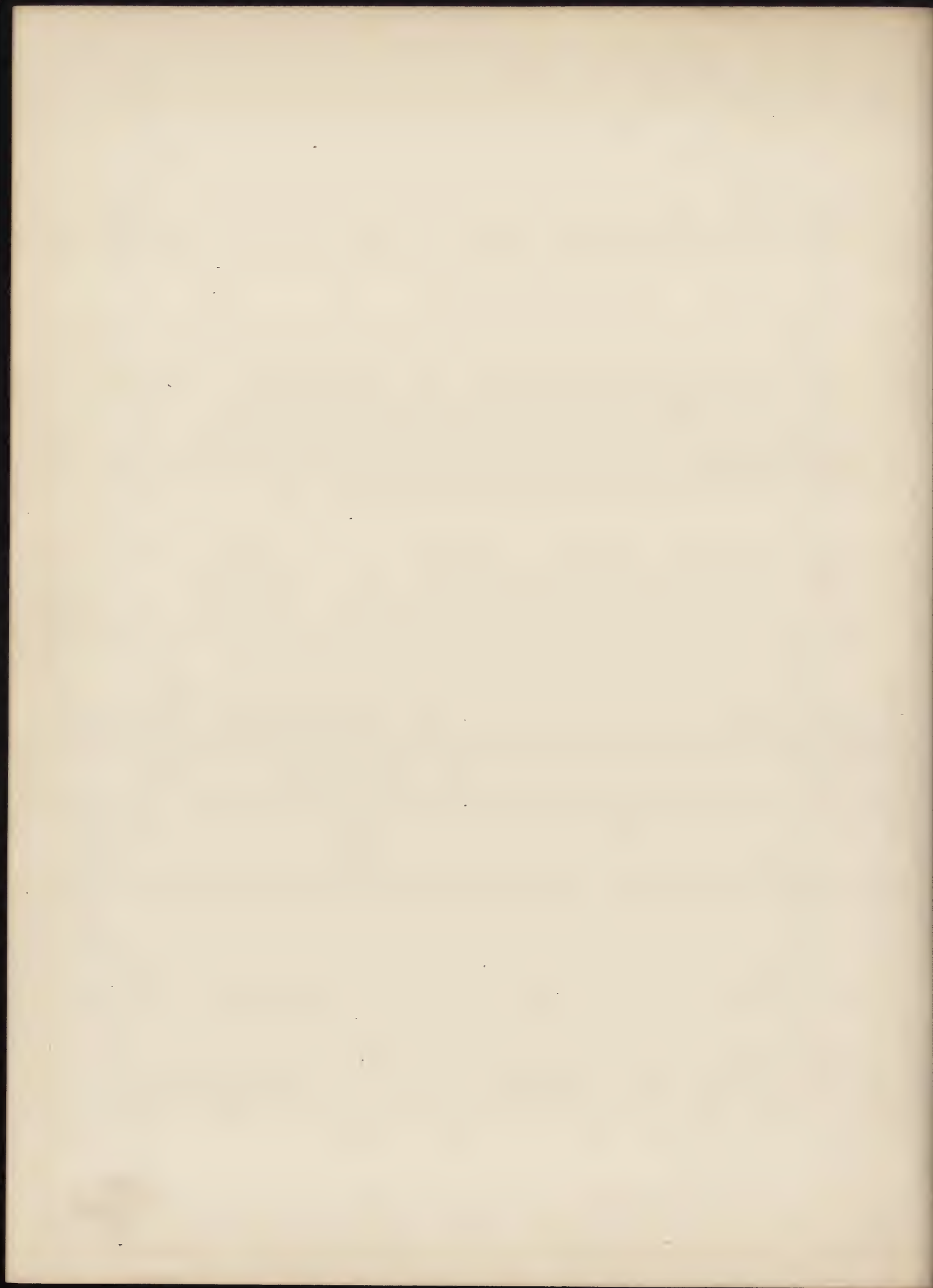


GANTHEM CHURCH, GOTLAND. (VIEW FROM THE TOWER).





MÄSTERBY CHURCH, GOTLAND. (THE CHANCEL).



XV.

MEMOIR OF THE LATE PROFESSOR DONALDSON,
*Past President, Royal Gold Medallist.*By EDWARD A. GRUNING, *Member of Council.*[Read on Monday, 1st February 1886, Edward I'Anson, F.G.S., *Vice-President*, in the Chair.]

THOMAS LEVERTON DONALDSON was descended from an old Scottish family long settled in Ayrshire, where his successors still possess an entailed estate named Williamshaw. His father was an architect and a district surveyor, and many of his mother's relations were engaged in building operations either theoretical or practical. His great uncle Thomas Leverton, after whom he was named, was one of the chief surveyors of the Board of Works, Surveyor to the Phoenix Assurance Society, and architect of the existing Grocers' Hall. Born in Bloomsbury Square on the 17th October 1795, he was the third of four sons—the eldest died in infancy—the second of fever at the age of 22, an event which had some influence on the adoption of architecture by him as his profession. The fourth son, William Leverton, was formerly well-known amongst us as our Honorary Solicitor, a post which he held from the formation of this Institute until his death in 1861. There were also two sisters, Jane—the only surviving member of the family—and Mary, married to the Rev. Henry Byam Nicholson, many years Rector of St. Alban's, Herts.

He was married in 1825 to Matilda Georgiana Lingham, who died in 1876, shortly after the celebration of their golden wedding—and had three sons. The eldest, Thomas Olinthus, a Member of the Institution of Civil Engineers, is well known to many of us, and was a pupil of Sir Charles Hutton Gregory, K.C.M.G. He has no living issue. The second, Leverton, a young officer of the greatest promise, after the then usual course of study at Addiscombe, where he greatly distinguished himself, obtained a commission in the Bengal Engineers, and, to the inexpressible grief of his father, was killed at the head of the storming party in the assault on the White House Picket, during the advance to Rangoon in the second Burmese War of 1852. The third, James Smollett, unhappily now an invalid, was educated in his father's office, and was formerly one of our Associates. He married, in 1862, Emily, the youngest daughter of the late John

Frederick Gruning, and has five sons and one daughter; of the sons the eldest, Leverton, is now serving his country in the Soudan as a Lieutenant of Royal Artillery, and was attached to the Camel Battery in the advance to Metammeh and attempted relief of General Gordon at Khartoum. The youngest is a naval cadet on board the "Britannia" at Dartmouth, and the rest are studying for the various professions they intend to follow.

Like some other members of our profession who have risen to eminence in it, Donaldson was not educated for or originally intended to become an architect.

Educated at the Grammar School of St. Alban's, then, and for many years afterwards, held in the Lady Chapel of the Abbey, he left it at the age of fourteen, after a stay of five years, to accompany Mr. Robert Stuart, a leading merchant at the Cape of Good Hope, to that Colony, with the view of entering his office. But thrown much into the society of the military officers then stationed there, with whom he had become a great favourite, he joined the 87th Regiment then about to proceed with other forces to the capture of the Mauritius. Colonel Butler, of that Regiment, allowed him to join as a volunteer with the promise of the first vacant commission, and also to attach himself to the storming party directed against the western side of the town. But, here his military career both began and ended. The French made no defence and surrendered without firing a shot. There was no vacancy for him, and he eventually returned to England in "La Manche" frigate, one of the prizes taken by the expedition.

Returning to England at the age of sixteen he appears, rather against his own inclination, but in deference to the wishes of his parents, to have commenced the study of architecture under his father's direction. He entered the Royal Academy as a student in the Antique School, and in 1817 carried off the Silver Medal for the best measured drawing of the west front of Greenwich Church.

On the completion of his home studies in the beginning of 1818, being then twenty-two years of age, he left England for a lengthened tour abroad, at that time, owing to the scarcity of architectural books and engravings, and the entire absence of photographs, the only means of becoming acquainted with the noble works of ancient architecture.

I do not propose in this sketch to follow Donaldson through all his wanderings, of which, however, he has left a short account, and of which some of his diaries are still extant. He was absent from England for nearly five years, his time being spent in travelling and in diligent study, sketching and making measured drawings both of the great monuments of antiquity and of the principal edifices of modern Rome. Generally his route lay first to Florence, whence he made pedestrian excursions to Siena and other neighbouring towns—then walking to Rome—always studying on the way. At Rome he remained a year; thence to Naples, and in the autumn of 1819 to Greece. The work he did there is known by his contributions to the supplementary volume of Stuart and Revett's *Antiquities of Athens*, published in 1830.

Then from Greece to Asia Minor, a journey occupying four months, and including visits to Ephesus and Halicarnassus. This journey was made in company with a number of other architectural students and artists, all on horseback, all living as natives of the

country, and all in Turkish costume. On his return to Athens he continued his study of ancient Greek architecture, visiting all the towns and places likely to yield any reward for his assiduous labours.

Proceeding thence to Italy, he suffered a quarantine of forty days at Malta; but, with the energy which characterized him through life, he only looked on this very unpleasant and dull detention as a good opportunity to complete his notes and to draw out to scale the different buildings of which he had taken such careful measurements. Then followed a tour in Sicily and Southern Italy, a stay at Naples and Pompeii; the work done at the latter place being afterwards utilized, as we shall see, in the notes of his literary works. On his return to Rome he again remained there about a year, mainly devoting himself to the modern architecture of that city, with occasional visits and excursions, mostly pedestrian, to all places of interest within reach.

It was during this visit that he made the design for a Temple of Victory, his own drawings for which hang on our walls. This design, redrawn and somewhat modified, was exhibited in the great Exhibition at Paris in 1855, and then gained him the great Gold Medal [Illustrns. xxv., xxvi.]

This design first brought him into prominent notice; for Canova, then President of the Academy of St. Luke, brought it before that Body, with the result that he was elected a member. His diploma was signed by Canova himself. I believe that of all the distinctions he subsequently received during his long life he valued this, the first one, highest of all. Then homewards, through Northern Italy, where his drawings and the success achieved at Rome procured his election at several of the Academies of the principal cities. His companions and fellow students abroad included, amongst others, Lewis Vulliamy, Huyot, Dedreux, Jenkins, Lewis, Wolfe, Charles Tyrell and Henry Parke (both pupils of Sir John Soane), Turner (afterwards the great painter), and Frederick Catherwood, known as a traveller and writer on Mexican antiquities, who was lost in a collision between two steamers in mid-Atlantic in 1853.

With his return to England began active work. In 1823 he competed for the completion of King's College, Cambridge. His first building was a church at Brompton, which he obtained in competition. It cannot perhaps be called a success, but the days of the Gothic revival were then young, and it was at all events a step in the right direction. His own words may here be well quoted as illustrating the then general state of knowledge on this subject. He said, "It was a matter of great regret to me at the time, and subsequently, that my previous studies had ill qualified me for such a subject in the Gothic style, and that my design also from motives of economy had been stripped of a considerable portion of the embellishments which give effect to mediæval architecture."

In 1827 he was employed by Mr. W. B. Cooke to edit and complete a folio work on Pompeii, with views by Major Cockburn. He also contributed the description to two quarto volumes, published by Mr. Cooke, entitled "Selection of ornamental Sculptures from the Museum of the Louvre," and "Twenty-four select Views in Italy," one of which views was engraved from a drawing of his own.

In 1833 and 1836 appeared in quarto his "Collection of the most approved examples of Doorways from ancient and modern buildings in Greece and Italy," dedicated to the Institut de France, of which he had recently become a corresponding member. This work was translated and published in France in 1837.

Three years previously he began the great labour, and I may confidently say, the labour of love of his life, in connection with this Institute, of which he may practically be considered the founder, and of which he was eventually the only surviving original member. This part of his work has been dealt with by abler hands than mine. But I think I may say that here, as in everything he undertook, he worked with unceasing energy—not for his own advantage or glory, but with the objects he throughout life held most firmly in view—for the advancement and purity of our profession, the abolition of abuses, and above all the dissemination of the knowledge of architectural art.

"Architectural Maxims and Theorems," a small work, appeared in 1847, a translation of which was published in the "*Moniteur des Architectes*." The articles on "Limes, Mortars and Cement" in the *Encyclopædia Metropolitana* of 1840 was also from his pen, and remained for many years the only standard work on that subject. His work entitled "Architectura Numismatica," on ancient architectural medals, appeared in 1859, a summary of it having been previously read here as a sessional paper; and his last published work of importance, "Specifications," in which he was assisted, so far as the legal parts were concerned, by Mr. William Cunningham Glen, Barrister-at-Law, also appeared in that year.

Turning back to his more professional pursuits, he competed in 1840 for the rebuilding of the Royal Exchange, then recently burnt down. His design [Illustrn. xxvii., xxviii.] was selected as the best of the first class, and he always felt and expressed the opinion that he should have been entrusted with this work. But as only too many of us have experienced in the course of our practice, this did not by any means follow as a matter of course—as undoubtedly it should have done—and eventually the work fell to Sir William (then Mr.) Tite. Am I doing wrong in remarking that in the design actually carried out, and particularly in the portico, there is a marked similarity? [Illustrn. xxvii.] In the previous year he had competed for the Nelson monument in Trafalgar Square, a main feature in his design being the adaptation of Cleopatra's Needle, now standing on the Victoria Embankment.

For one so well and generally known, both to our profession and the public, his works were neither extensive nor numerous. Besides those mentioned the principal buildings he designed were—

All Saints' Church, and the University Hall, Gordon Square, London.

Library, Laboratory, Flaxman Hall, and Grand Staircase, University College, Lond.

The Scots' Church, Woolwich, in the Norman style and seating 1000 persons.

Mr. H. T. Hope's House, 116, Piccadilly, London, now used as a club. This in conjunction with Mr. Dusillion, of Paris.

Study and alterations to Broadlands, Hants., the seat of Lord Palmerston; Agent's House, Schools, Chapel and other works on the same Estate.

House for Mr. Henry Hippisley, Lambourne, Berks.

„ „ Mr. Pugh, in Hamilton Terrace, London.

„ „ Miss Collins, Maze Hill, Greenwich.

„ „ Mr. Fred Lee, R.A.

„ „ Mr. W. E. Hubbard, in St. Leonard's Forest, Sussex.

Workshops for Printers in Margaret Street, Cavendish Square, London.

Shaw's Printing Office in Fetter Lane, London:

Schools and Vicarage for the Earl of Lucan, at Chertsey.

Various Works for the Marquis of Londonderry at Seaham (Co. Durham).

Restoration and additions at Shoebrook Park, Devon.

„ of Wareham Church, Dorset.

„ of Lambourne Church, Berkshire.

A Bridge in Holland.

Ragged Schools in Great Wild Street, Drury Lane, London.

The German Hospital at Dalston, London, as joint architect with myself.

His last work was the rebuilding of the Hall of the Scottish Corporation in Crane Court, Fleet Street, after its destruction by fire in 1877. This work he carried out successfully under his own immediate supervision, and from drawings and details by his own hand. It was completed in 1880, when he was 85 years of age.

The district of South Kensington he held from 1844, though for the last few years he was obliged to leave the active work in the hands of his old and highly valued assistant, Mr. Alfred Williams, now his successor. He was also Surveyor to the Society of Barnard's Inn, to the Kentish Town Estate of General Sir David Leighton, K.C.B., on which a very large number of houses was constructed under his supervision, and for some years he was Consulting Architect to the Commissioners in Lunacy.

Throughout his life he devoted a great part of his time to objects of public and professional interest and utility, possibly greatly to his own immediate detriment. For ten years, from about 1835, prior to the passing of the act of parliament which called the Metropolitan Board of Works into existence, he held the position of Chairman of the Commissioners of Sewers of Westminster and part of Middlesex, succeeding Mr. George Saunders. The importance of this position may be judged from the fact that, during his tenancy of office, he superintended and promoted the construction, amongst other works, of fifty miles of sewers, including the great King's Scholar's Pond Sewer, and directed an expenditure of upwards of a quarter of a million. On his retirement, he was presented by his brother commissioners, in token of the value of his services and of the zeal which he had displayed in the public service, with an address and a pair of silver wine coolers of the value of one hundred guineas.

As Professor of Architecture and Construction, at University College, London, he must be very well remembered by many members of the profession. He always paid great attention to the preparation of his lectures, and was most anxious to have them copiously illustrated by diagrams and drawings, often also by practical examples of the methods used by skilled workmen. The illustrations were always at the service of the

students, to be taken away for private study and copying, and were afterwards presented by him to the college.

Visits, with full verbal descriptions, to the principal buildings and art collections in London, formed a pleasant part of this course of instruction.

Of his private or articulated pupils so far as I can ascertain, only two are living and in practice: our distinguished Fellow John Pollard Seddon, who has made his name and reputation in a widely different field to that in which he received his early education, and myself; and I can speak from my own personal experience of the true kindness we received, of the conscientious manner in which Professor Donaldson taught us, and of the amount of time he devoted day by day to our instruction. On resigning his professorship in 1865, a committee of his colleagues was formed to found some public record of his services. A gold medal, with his portrait, was struck from a design by the Messrs. Wyon and presented to him in 1866. Impressions of this medal in silver are supplied from the fund under the care of the Institute Council, and annually competed for by the classes now presided over by Professor Roger Smith, who succeeded Professor Hayter Lewis—Donaldson's immediate successor.

In the great Exhibition of the Industry of all Nations, 1851, he was appointed a member of the building committee, in company with Sir Charles Barry and Professor Cockerell as architects, and Messrs. W. Cubitt, Stephenson and Brunel, as engineers. Subsequently, by desire of the late Prince Consort, he prepared designs for the utilization of the estate purchased with the surplus proceeds of the exhibition as art galleries and museums.

He was also one of the architects selected to compete for the National Memorial to the Prince Consort.

In addition to the honours already mentioned, he received the following:—

The Cross of the Order of Leopold of Belgium.

Honorary Degree of Doctor of Philosophy of the University of Kiel.

Membership in 1863, as one of the ten Foreign Associates of the Institut de France—Section of Architecture (Académie des Beaux-Arts).

Membership of the Athenæum Club, by special resolution of the Committee.

He was a correspondent of Academies and Societies in the following cities:—

Rome.	Naples.	Parma.	Stockholm.	Copenhagen.
Florence.	Venice.	Vienna.	Antwerp.	Ghent.
Bologna.	Milan.	Berlin.	Brussels.	New York.

He was a trustee of the Soane Museum, and of the Architects' Benevolent Society.

In the Architectural Publication Society he likewise greatly interested himself, and was treasurer from its commencement in 1848 until 1860. He contributed largely to the varied illustrations of the "Dictionary of Architecture" from his own stores of original sketches and drawings, and carefully read and revised each proof until within the last few years, when he informed the secretary that he was no longer equal to this exertion.

So far I have followed the Professor's career, and now come to the close, and this I cannot do without bearing the most heartfelt testimony to his many great and good

qualities. As we all well know, he was earnest in everything he undertook, indeed often impetuous, and that sometimes to such a degree as to lead others to believe that he only sought to impose his own will upon them. But this was not the case; he acted throughout from a strong sense of right; and, to the entire neglect of his own personal interests, was ever ready to take up the cudgels on behalf of others. His guiding motive was always based on the interests of his profession and on the advancement of his art. I could, did time permit, give many instances of this, as well as of his true kindness of heart, and ever genial hospitality. He was always at the call of any member of the profession wanting advice or assistance, and many a now prosperous architect will recollect the advice and assistance he thus obtained. To the last he delighted in the society of his near relations and friends, and it was touching to see, during the last years, when his former impetuosity had deserted him, how he delighted in welcoming them, and how sensitive and grateful he showed himself for even the smallest act of kindness or attention. He died on the 1st of August 1885, after a short but serious illness, being then only two months less than ninety years of age.

EDWARD A. GRUNING.

XVI.

THE LATE PROFESSOR DONALDSON: HIS CONNECTION
WITH THE INSTITUTE. By WYATT PAPWORTH, *Fellow*.

[Read on Monday, 1st February 1886, Edward P'Anson, F.G.S., *Vice-President*, in the Chair.]

HONOURED by the request of the Council to place on record the interest taken by Mr. Donaldson in the Institute from its formation, I must premise that though my intimate acquaintance with this Body does not date from so early a period, yet, with my father as one of the first Vice-Presidents, and my brother as one of the early Associates, I may claim at least a traditionary knowledge of many circumstances at the earlier stages of the History ; and I may also record that I attended a meeting of the Institute in King Street, Covent Garden, held 27th July 1836 ; attended the Students' Class of those early years, and became a Fellow in 1860, at the persuasion of our revered President, Professor Cockerell. A long personal acquaintance with Mr. Donaldson in connection with two other societies from 1840, gave me personal evidence of his great zeal, general friendliness and good feeling, in all of them, and enables me to fulfil with a melancholy pleasure this request of the Council.

I do not remember that the true *Origin* of the Institute has been clearly recorded, though it was indicated by Mr. Eastlake in his "Historical Sketch."¹⁵ But having the advantage of a statement in Mr. Donaldson's handwriting, kindly supplied to me by Mr. Gruning, of the circumstances connected with the first proceedings, it will be accepted as of undoubted authority. It is as follows :—"In 1834 he (Mr. Donaldson) was invited "with other architects to attend a meeting called by some of the junior members of "the profession, who were then divided into two parties, to consider the expediency of "forming an Architectural Society. The scheme proposed seemed so crude and ill-digested, and appeared to be founded upon so narrow a basis, that Mr. Donaldson "suggested the propriety of a more extensive Association, and that a direct appeal should "be made to those at the head of the profession. In this he was supported by Mr. P. F. "Robinson, Mr. H. E. Kendall, sen., and others, and the meeting adjourned *sine die* to

¹⁵ See the TRANSACTIONS 1875-76, p. 259.

"allow those steps to be taken. After various meetings and a mature consideration of "this important proceeding, a well-digested scheme was drawn up, adopted by most of "the influential members of the Body, and the 'Institute of British Architects' was fully "inaugurated on the 15th June 1835; Lord de Grey being the President; Messrs. Donaldson "and Goldicutt, Honorary Secretaries."¹⁶ The other office bearers are named, and at this meeting it was announced that the Institute counted, among its members, 53 architects of established practice as Fellows, 14 Associates, and 24 other members. These are to be seen in a small volume then issued, together with the "First Address," of 2nd July 1834, with which we are now again familiar, it having been reprinted in the "Kalendar" for this year. The "Address," read at the meeting of 15th June 1835, was drawn up by Mr. Donaldson, "at the desire of the Council," and specially refers to the opening-up of communications with the several Academies abroad, as much promoted by the presentation of a medal struck by the architects of Great Britain in honour of, and presented to, Sir John Soane, R.A., the then chief representative of the profession. Impressions of the medal had been sent to nearly thirty of the foreign Academies, and proved to be the awakening of an interest in English architects, which Mr. Donaldson later did so much to foster and keep up. In this room the medal is well known, for, with the sanction of the trustees of Sir John Soane's museum, the die is used for the annual silver medal called after his name, but given at the expense of the Institute. It was on this occasion "that the thanks of the Institute were passed to Mr. Donaldson for "the zeal with which he has exerted himself in contributing to the formation of this "Society, and in furthering its best interests." He replied that he was devoted to the profession. "I have been," he added, "and shall always be so, and my humble abilities "shall ever be exerted in promoting the interests of this Institute." It is my duty to-night to prove how he kept his word. Two of the earliest subjects of his active mind were the Institute motto, "Usui Civium, Decorum Urbium," and the design for the Institute Medal. It will be unnecessary for me to trouble you with the details of the many Papers read at the evening meetings, and prepared by him from time to time, with pains and alacrity, comprising materials of great value and interest. Inevitably, if a young institution is to succeed, "the labouring oar" (an expression used by Earl de Grey at the meeting alluded to) must be the Secretary: at that time it was essential to have a Paper ready for any unexpected vacancy; now we have too many Societies to appreciate fully the labours of our friends.

¹⁶ Mr. John Turner and George J. J. Mair, F.S.A., *Hon. Associate*, have forwarded to me observations as to the origin of the Institute, as follow:—"The Architectural Society, founded in 1831, gave a *Conversazione* at Exeter Hall on 21st March 1834. Towards the end of it many of the senior members met; Messrs. Goldicutt and Turner considering the advisability of consolidating those members into a Society, several meetings were held, which culminated in the formation of the Institute. Another important movement, which indirectly but very materially aided the founding of the Institute, was the Presentation of a Medal to the late Sir John Soane, the Committee for which met 1st February 1834, and it was presented at Sir John's House by Sir Jeffry Wyattville on 24th March 1835; the Address was written and delivered by Mr. Donaldson. A ball was given to the Profession in the evening at Freemasons' Tavern: John Turner, secretary; the late John Goldicutt, treasurer."—W. P.

In 1835 was published by the Institute the pamphlet entitled "*Questions upon various subjects connected with Architecture—for the purpose of eliciting uniformity of observations and intelligence in communications to the Institute.*" No one perusing it could doubt who compiled the manuscript, and the suspicion of its being by Mr. Donaldson is confirmed by the preface, which is signed by him, and which states that "the members have considered it due to their friends and well-wishers to authorize their Senior Secretary to compile a series of '*questions*,' embracing most of the points connected with the practical departments of Architecture. Of this work 1000 copies were distributed; it was twice translated into German, being published at Hamburgh and Vienna; into Italian by the Institute of Fine Arts at Naples; and it also appeared in America." The Council of 1841 thought it expedient to print another edition with considerable additions; and perhaps we may point to the author of this little tract as the best exponent of the use of it, evinced by the number and value of his own contributions on almost all the subjects named in its forty pages. It was in the autumn of this year that the Vice-Presidents each gave a conversazione, each at his own house, to make known the establishment of the Institute and to create a friendly feeling among the members; Mr. Donaldson, then living in Hart-Street, added one to the number.

In 1835, to further the formation in our library of a complete series of the printed editions of the father of our profession, he compiled *Particulars relating to the Manuscripts of Vitruvius preserved in various European Libraries*, a valuable contribution on the subject; several copies of the printed editions were presented by him to the library. In 1836 he gave us a *History of the construction of the Peristyles of the Basilica at Vicenza by Palladio, from the Italian of Arnaldi: also Italian Towers; Composition in Architecture: On the means lately employed for placing the Statue of Napoleon upon the Colonne Vendôme, at Paris, and Geological phenomena connected with the origin and sources of Porphyry and other rare marbles used in Architectural embellishments.*

The Institute had hitherto acted upon its "Regulations," or By-Laws as they are now called, but on the 6th February 1837 the Council presented to the members *The Charter of Incorporation*, with an "Address" which is given in the first volume of the TRANSACTIONS printed at that time.

Now, when the Charter is under consideration, it may be well to note that the Annual Report of the Institute for 1862 (p. 17) records the decease of the Honorary Solicitor, W. L. Donaldson, and states "that to his skill and care at the commencement was due the framing of the Charter and Bye-Laws." Can we imagine that this was done without the assistance of his brother Thomas? Is it now to be buried with its author? In this year he read *Memorandum respecting Buildings at Paris: Observations upon the different styles of Pelasgic or Cyclopean constructions existing in Greece; Architectural Notation*, an interesting essay explaining the many ways in which architects who have measured antique examples have marked the feet, inches, and parts on their drawings; and he was one of the Committee and drew up the Report, submitted 24th July, appointed to examine the *Elgin Marbles in order to ascertain whether any evidences remain as to the employment of colour.* Mr. Donaldson's name appears on the Committee that was

appointed 9th October 1838, to consider the subject of *Public Competitions for Architectural Designs*. The Report was submitted on 24th January following, and printed, and it may be doubted if any great efficient advance has been made on this important subject since that period. In the year 1838 also, he was one of the deputation appointed on behalf of the Institute to negotiate for the junction of "The Architectural Society" with the Institute, as it was felt that two similar societies were injurious to the well-being of the profession. For the Society it was claimed that the members of it, as a body, should be received into the Institute, and as this could not be agreed to under the By-Laws, for at that time we were all "Architects," the matter fell through; but on 3rd December eighteen of its members resigned, of whom thirteen joined the Institute. The extinction of the Society, in 1842, will be noticed. In 1839 he gave a *Description of the Double Entrance Gate at Pæstum*, another of the many results of his investigations when on his student travels: *Account of Notre Dame du Port at Clermont Ferrand*, perhaps the earliest reference to that curious structure: and *The Life of Apollodorus, the Architect, illustrative of the state of Roman Architecture during the reigns of Trajan and Hadrian*. In May of this year (1839), Mr. Donaldson resigned the post of Honorary Secretary, and became Honorary Secretary for Foreign Correspondence. On his retirement the members presented to him a silver "centrepiece" of the value of 100 guineas, and made him a Life member; in the following "Annual Report" it is recorded that "These and other communications are gratifying, as they evince the high estimation which the Institute continues to maintain in its foreign relations; and the interesting information and intercourse so obtained must be esteemed one of the peculiar and valuable results of its establishment. In this department, the Council have still the satisfaction of acknowledging the excellent services of Mr. Donaldson, who, although retiring from the duties of Honorary Secretary, which he had so ably and unremittingly discharged from the first formation of the Institute, continues to fulfil that important one, the Foreign Correspondence, with which he has become completely identified, with so much credit to himself, and advantage to the Society." Mr. Donaldson's contributions this year (1840) were *Aluminous Cements*; *Parker's or Roman Cement*; and *Vaudoyer's description of the column to the Emperor Alexander at St. Petersburg, designed by the Chevalier Ricard de Montferrand*.

For the year 1841 I have apparently nothing special to record, but the Report of 1842 notifies the junction of the two Societies referred-to in 1838, which is interesting to us at the present time under the view of the federation of country Societies. It declares, "A similar proposition having been lately revived, the junction of the two bodies has at length been happily consummated, the consequence of which is a considerable accession to the Institute of members and students, and the transfer of their collection of books, drawings, casts, and other effects, comprising much valuable property. But that which must be deemed the most important result of this measure is the further consolidation of the members of the Profession into one incorporated body, and the additional importance and efficiency which the Institute has thus obtained. As long as two Societies existed for the same objects, whatever might be their relative positions, it tended to create an unfavourable impression in regard to both; on the

"other hand, it must be obvious that unity of purpose is best effected by unity of exertion." On this occasion eleven Fellows and seven Associates (all architects) joined the Institute. The number of the executive body, the Council, was then increased from the minimum prescribed by the Charter. In the year 1842 Mr. Donaldson was appointed Professor of Architecture at University College, London; during the sessions 1842-43, and 1843-44, he was one of our vice-presidents, and also Hon. Secretary for Foreign Correspondence *pro tempore*. In 1844 he held the latter post only. In 1843 the acquisition of the *Xanthian marbles* gave occasion for further investigation as to the use of colour on ancient sculpture; and the former Committee again presented a Report that colour was found used in several instances on these marbles. Mr. Donaldson also wrote: *Description of the Church at Ani in Armenia*; *Arrangements of the Fronts of Houses in some Belgian Towns from XVth to XVIIIth Cent.*, illustrated by several of his own sketches made on the spot; and *Account of the Models of the Churches in Henry Vth's Chantry at Westminster Abbey*. During 1845 he read *History of Architecture from the Building of the Pyramids to the revival of Italian Architecture in XVIth Century*, a pretty good range; *Architectural and Iconographical Application of the Cross during the Middle Ages*; Report of a Committee *On the Drawings by Palladio now at Chiswick*. In 1846, *Remarks on the Models of the Parthenon*, made by R. C. Lucas, sculptor (one of which, showing its ancient state, is now in the British Museum); the essay by Louis Vaudoyer on *Damp in Buildings, its prevention and cure*; *Different Modes of constructing the Shafts of Columns of large dimensions*; and, not of lesser importance, the Report of a Committee *Relative to the position of the Equestrian Statue on the Archway at the entrance to the Green Park*; with another *On the ancient Sculptured Marbles from Halicarnassus*.

During the years 1846-47 Mr. Donaldson had a seat on the Council also, while retaining the Secretaryship for Foreign Correspondence. One of the interesting papers of the year 1847 was occasioned by the transmission of a *Design made by Il Cavaliere Niccolo Matas for completing the Façade of the Church of Sta. Maria at Florence*, which had been left undecorated since its construction. This resulted in an examination of the design, and a Report by a Committee on its merits, which met with much opposition, but was eventually carried, and the resolution forwarded to the architect approving of his design. Engaged with M. Dusillion on the erection of the residence in Piccadilly for Henry Thomas Hope, Esq., M.P., he, with our honorary member, Mr. C. H. Smith, visited the quarries at Caen in Normandy, for the selection of that material; and this visit produced the valuable Essay, *Caen, with remarks on its quarries*. His next contribution was the highly interesting description of the "*Cathedral Church of Saint Isaac at St. Petersburg*," which was reprinted in many newspapers. This paper was occasioned by the publication of the elaborate work by Monsieur Ricard de Montferrand, with illustrations, which enabled the Professor to describe to the meeting minutely the marvels of that edifice, and the elaborate construction of the iron dome. The invention by Mr. Hale Thomson of a new process of coating glass surfaces with a deposit of pure silver was the occasion of an elaborate paper by Mr. Donaldson "*On the Manufacture of Glass, and its application to Architectural purposes*," which was printed as No. 4 of the "Abstracts of Papers read:"

a series that was commenced at the beginning of the session 1849-50. In May 1849, on the retirement of Mr. George Bailey, one of the Honorary Secretaries, Professor Donaldson occupied that post, at the same time that he held that of Foreign Secretary, until the vacancy was filled up, in the year following, by the election of Mr. C. C. Nelson, whom we all so highly esteemed for his learning, urbanity and friendship.

By a Resolution of the same date (May 1849) the Council reviewed the then position and prospects of the Institute, and submitted a Report on 26th November, stating—"They did not deem it expedient to suggest any alteration in the By-law which regulated the professional practice of the members. But the General Meeting thought proper to refer back this important question for further consideration. The Council *again* confirmed the principle that no alteration should take place in the practice of the Fellows, but agreed in the reiterated expression of opinion on the part of the General Meeting, and recommended a modification with regard to the Associates; and this, being submitted to a General Meeting in March (1850), was confirmed. The Council feel that, in making this alteration, the Institute must rely for a justification of the propriety of this departure from the original constitution upon the high-minded and conscientious principles which should actuate the Associates in the exercise of this exemption from the strict line of practice to which Fellows are limited. They must ever bear in mind that the proper position of the professional man is between the employer and the employed. The Associate, if engaged by the latter, must not countenance or support undue profits or enormous demands." These paragraphs are thoroughly Donaldsonian! Vexed as he may have been at the alteration of the *By-law* (the question was not with the *Charter*), as lowering the dignity of the professional man, yet in giving way to the majority, he practically says, "Now do be good boys, and do not disgrace the profession, the Institute, or yourselves."

In the Annual Report for 1851, it is recorded that "the approval by the members, at an Ordinary General Meeting, of the recommendation of the Council by which the Royal Gold Medal was awarded to T. L. Donaldson, Fellow, must be regarded as testifying their appreciation of the services of a Professor to whose name, as an architect and a contributor to the literature of the Art, is justly attached a world-known reputation." In January 1852, the publication by his intimate friend J. J. Hittorff, of Paris, *On the Temple of Selinuntum, or the Polychromatic Architecture of the Greeks*, was brought forward by the Professor, and occasioned a learned *résumé* in support of its contents on two evenings, which proved the great interest of the subject, as well as how various were the opinions on the vexed question of the extent to which the temples were embellished with colour, and when it was done. The subject of the paper that followed was one of more interest to us as British subjects, namely, *The present condition of the Royal Tombs in Westminster Abbey around the Shrine of Edward the Confessor*. On this paper he expended most careful thought, both in its composition and conception; his own warm-hearted feelings, combined with his reverence for the departed monarchs of England, contrasted with the then lamentable condition of the tombs, his most touching and eloquent sentiments, that drew forth appropriate applause, culminated

in the spirit-stirring description, artistically delivered, of King Edward III, with the poetic lines referring to his valiant son. The remarks were concluded by his urging that as by "the common custom of the land a family is answerable for the maintenance of "the tomb of a deceased relative," so "let us hope that the high-minded advisers of the "Sovereign will appreciate this duty, and show their loyalty to the throne, and prestige "of the crown of England, by causing the restoration of these memorials of ancient "sovereignty." I need not quote further, but relate how the meeting was adjourned for discussion; how a day was spent in the Abbey for the inspection of these royal tombs and other antiquities, under the guidance of Sir George Gilbert Scott, who was then the professional adviser to the Dean and Chapter. Another evening of elaborate discussion ensued, with the practical-result of a resolution, moved by Mr. Donaldson and seconded by Mr. John Papworth, that "a humble address he presented to the Queen, praying for "a Commission for the purpose of taking into consideration the dilapidated condition "of these tombs, with a view to the adoption of such measures as may be proper for the "preservation and perpetuation of these important National Monuments." "A good "practical result was likely to ensue," remarked the chairman of the meeting, "as it "must tend to confer character and credit on the Institute." The matter dragged through the First Commissioner of Works and Public Buildings; Sir G. G. Scott reported upon the state of the tombs to him; and in the Report of 1855 it is stated that "a "certain sum of the public money has been voted for the purpose of preserving the "royal monuments in Westminster Abbey. No restoration has been attempted, but it "is understood that measures will be taken to arrest their further decay, and that records "of the monuments in their present state will be kept by means of drawings and models." What was the amount of the sum voted, and what was done with it, and whether any drawings and models have ever been made, I cannot say.

I must refer back to 1853 to notice Mr. Donaldson's papers on "*A Certain Class of Gallo-Byzantine Churches in and near Périgueux; Architectural Medals and Coins of the Ancients, as Illustrative of the Edifices of the Greeks and Romans,*" which was the precursor of the interesting work published by him on the same subject; while a tour or ramble in France with a visit to Lille, occasioned "*Remarks upon the Buildings at Lille,*" and a "*Description of Original Drawings presented by the late Chevalier Wicar,*" to the museum of that city. In 1854 he read "*Brief Account of the Palaces of the Louvre and Tuileries at Paris;*" in 1855, "*Description of some of the Constructions now in course of execution between the Louvre and the Palais Royal at Paris;*" in 1856, "*Triumphal Arches of the Romans,*" and "*Account of Alnwick Castle, Northumberland,*" which last was occasioned by the visit to England of the Commendatore Canina, of Rome, to advise the Duke of Northumberland as to the restorations proposed to be carried out by him, in the Italian style, in the interior of this mediæval building, and to adapt it to modern requirements—a subject then of greater interest possibly than now. In 1857, the "*Description of the Streets Proposed to be formed by the Metropolitan Board of Works*" explained to us the first of a series of the large undertakings, following on the establishment of that much maligned body. Having been commissioned, a year or

two earlier by the Government, to proceed with others to Ireland to examine into certain allegations respecting the lunatic asylums then recently built in that country, he, with note-book in hand, collected materials to supply the interesting paper read by him in 1858, entitled "*Wayside Memoranda during a tour in Ireland*," a kind of supplement to other papers on the antiquities of that country, read by other members at our meetings. The Report of 1859 states that "in addition to the retirement of Mr. Digby Wyatt, the Council have to announce, with feelings of great regret, that Mr. Thomas Leverton Donaldson has communicated to them the wish that he may be allowed to give up the position of Honorary Secretary for Foreign Correspondence. Mr. Donaldson writes, 'that after so long a service in the cause, he now retires without regret, for at the same time that he feels the importance of that very interesting department of our operations, he has the conviction that there are those whose impressions of foreign countries are more recent and fresh than his own, and who are acquainted with the living celebrities of our art abroad; and that they will be able, by such acquaintance with foreign architects, a knowledge of their works, and a mastery of the languages of the continent, to carry on the foreign correspondence with credit and usefulness to the Institute.' The Council believe that the following Resolution, which they forwarded to Mr. Donaldson after the receipt of his communication, expresses the feelings of the members at large as well as their own. The proceedings of the meeting on this occasion it does not become them to indicate, though they may be allowed at once to join in it by anticipation:—

"The Council of the Royal Institute of British Architects hereby place on record their sense of the invaluable services which have been rendered to this Institution by T. L. Donaldson, Esq., whose resignation of the office of Honorary Secretary for Foreign Correspondence they have this day to at once accept and deplore. For twenty years that office has been held by Mr. Donaldson, with honour to himself and benefit to the profession both at home and abroad, and for several years previously to his acceptance of that office, the even more onerous duties of joint Honorary Secretary had been no less sedulously and creditably performed by the same gentleman. No resolution, however powerfully it may be worded, can be adequate to convey a just impression of the Council's estimation of such services given for so long a period—so freely, zealously, and with an enlightened jealousy for the conservation, at all times and under all circumstances, of the best interests of the art and its professors. They desire, nevertheless, to place upon their minutes this inadequate record of the feelings of gratitude which they will ever entertain towards Mr. Donaldson, for his untiring labours to uphold this Institution, and all that is most worthy of admiration in the cultivation and practice of the Fine Arts."

At the Annual Meeting it must have been considered that little more could be added, for it was simply Resolved: "That a special vote of thanks be given to Matthew Digby Wyatt, Esq., Honorary Secretary, and to Thomas L. Donaldson, Esq., Honorary Secretary for Foreign Correspondence, upon their retiring from office, for their never-

"ceasing attention to the interests of the Society during the period they have held office." There have been numberless occasions to prove that Donaldson's relations with foreign and English architects enabled him to do considerable service to his professional brethren and to students. A letter of introduction from Donaldson, the Foreign Secretary, was a passport to all the chief architects of Europe for assistance in the study of the buildings of the localities, and was often an introduction to a life-long friendship with its recipient. Most, if not all, of the Honorary Corresponding Members, up to that period at least, had the introduction, if not nomination, to this body by our friend; the correspondence with them was kept up by him; and our library and collections were abundantly aided by the important contributions of foreign publications, at a time, too, when our own funds prevented any purchase of such very desirable works.

In the winter of 1860, Professor Donaldson went on a practical visit for the Government to Egypt, and while there, having found a few days leisure, he employed them in passing from Cairo to Ghizeh and Saccara. He was the first to explain to the Institute the wonderful discoveries made there by Mariette Bey, comprising *the Serapeion of Memphis, and the tomb near the Great Sphinx*; adding a few remarks on *Fellah Arab Architecture*, and the *Ancient Catacombs at Alexandria*, some more of which had also been recently disinterred. At the Annual Meeting in May 1863, our esteemed friend was elected President, succeeding to Sir William Tite. He opened the Session in November with an "Address" to the carefully considered details of which I should have wished your attention, as it materially assists in marking an era in the history of the Institute, and would have enlightened many of us on things long past, and be new to many members. It unfortunately had to refer to the decease of our first professional President, Charles Robert Cockerell, and concluded a discourse which eminently exhibited his large resources of thought and diction, by a reference to the high functions of Architecture; and, said he, "the Architect it is, who with his pencil and compass, with a mind full of deep things, under God's providence and with his brave heart, creates all this and toils on unheeded, often misunderstood, frequently blamed, rarely encouraged except by his own bright star of hope and faith. Let us, then, work on with the consciousness of something within us, which may sooner or later, before or when in the grave, be at length understood, admired, honoured by our fellow man."

The first matter of public interest after his election was a summons for a Special General Meeting (22nd June 1863), to consider the propriety of presenting a petition to Parliament against the grant of any public money for the purchase of the temporary building of the International Exhibition of 1862. The Council were requested to examine the building and to report. Well do I remember the visit to the building, and the utter disgust exhibited on the usual placid face of the President at the doings of the "Fancy Fair" then being held in the structure devoted to Fine Art. The report of the Special Committee was adopted by the Council and signed by the President, and at the Adjourned Meeting of the members held on 29th June it was resolved, "That the report just read be adopted, and that a petition to the House of Commons embodying the same be presented in the name of the Institute, and sealed with the corporate

"seal." The report, as you may remember, condemned the proposed scheme for the purchase and reparation of the building, as a transaction impracticable in itself, and fraught with unprecedented probabilities of discredit and disappointment. In the "Address" above referred to, the President noticed "the prompt and vigorous measures" adopted by the Institute to prove to Parliament and to the British public the impolicy "of preserving the Exhibition Building of 1862 for the reception of the Natural History division of the British Museum." Had the committees the courage of their opinions more in those days than at the present time? He read a *Description of the Tribunal de Commerce then erecting at Paris by Monsieur Bailly*, and visiting that city, which he loved so well, at the end of the year he returned with copies for our Library of 167 of the working drawings, done in autographic ink transferred to stone or zinc, of that great edifice the *New Opera House*, then in course of construction under the direction of the young architect Charles Garnier. This valuable set of drawings was added to by others. Would that the Fellows of our Body contributed even the photographic copies of their own works! He, at the same time, obtained from the Marquis de Vogüé, particulars of *The Hauran, near Damascus, with the discoveries in the country about Aleppo and Antiocheia*, and explained them to the meeting. As President he delivered his second "Opening Address," viz., for the Session 1864-65. In it he passed the quiet criticism, "I do not pretend to say that we have acted throughout with the most sober judgment, or with all possible energy and activity. But it must be recollected that what we have effected, although done under the immediate patronage of the Crown, has been realised without Government aid, and through the contribution of our members and private individuals; that at our earliest formation we had many professional prejudices to overcome, many adverse judgments to reconcile, many professional jealousies to conciliate. But in spite of all this we have so far succeeded, and are ready progressively to confirm our position, to advance with the rapid progress of society and of science, to keep our Profession in the van, and to maintain its rank among the learned and scientific institutions of the Empire."

On the 15th January 1866, a testimonial of a gold medal bearing his portrait was presented to him by some of the members on his retirement as Professor of Architecture at University College, after having filled the chair for twenty-three years, "to commemorate his long and zealous services in promoting the study of architecture." The residue of the fund also founded the Donaldson silver medal, given by the Institute but awarded by the Professor to the successful student in his class. His paper, in the same year, "*Practice of Architects and Law as to Easements of Light and Air*," followed on a communication by Professor Kerr at the previous meeting; and in 1868, "*Antiquities of Fréjus in the South of France*," which was the outcome of a visit by the ex-President, Mr. Tite, who had the opportunity of seeing some curious remains in that part, and had written the particulars to Mr. Donaldson. From that subject of architectural interest, he introduced to the members, by a series of drawings, the gigantic shed-roof then in course of erection at the *Terminus of the Midland Railway, near King's Cross, London*. The results of another journey to Palestine and Syria during the winter of 1868-69,

produced "*a communication*" from him while *en route* from Athens to Trieste, and another two months later while at Rome. On his return he described "*the Tomb of Titus Claudius Vitalis, a Roman architect*," which had been discovered shortly before, and had attracted his attention; and on the same evening he gave a "*Description of Ruined Buildings in Palestine*," and references to the city of Jerusalem.

I should have premised that in 1867 he again accepted office as Hon. Secretary for Foreign Correspondence on the resignation of Mr. C. F. Hayward, and then acted in conjunction with Mr. John P. Seddon as Hon. Secretary for Home Duties, which lasted until May 1871. During 1870, besides a learned "*Notice of the inscriptions in the Temple of Augustus and Rome, at Ancyra*," relating to the works of that Roman Emperor, he gave an elaborate account of the "*Autograph Drawings of the Great Masters of Architecture*," in the various collections abroad and at home; and a third "*On the mystery of the Tomb of Charlemagne, at Aix-la-Chapelle*." This account of "*Autograph Drawings*," was supplemented by him in 1872, showing the result of his researches in the collections at Naples and Milan. On 6th May in this year, the portrait of the then ex-President, which had been painted by Mr. Charles Martin for the adornment of our Hall, was presented by the subscribers to the fund, as a lasting memorial, not only of his presidentship but of respect and esteem. Four years elapsed when, in December 1876, he read a *Notice of the present Travels of H. M. Consul-General Lieut.-Colonel Playfair*. In 1878 he wrote *Obelisks, their purpose, proportions, material, and position*, which was followed by a discussion at an ensuing meeting. On the evening of the 26th April 1879, the Institute dined at the Freemasons' Tavern, on which occasion H.R.H. the Prince of Wales honoured the Institute with his company, and in his speech, he made special reference to our revered and distinguished friend who was also present. On 1st December following, Professor Donaldson presented the gold badge and chain of office, to be worn on occasions by the President for the time being. He preferred making this gift in his life time to leaving an amount in his will as he had purposed doing. Mr. John Whichcord, then President, whose sudden decease was lamented by all of us, was the first to be invested with it, by Mr. Charles Barry on behalf of the donor, who unfortunately was too unwell to perform by his own hand that interesting ceremony. In June 1880, he read a communication entitled *The Chaeroneian Lion*, from his old friend the Hon. Corresponding Member at Athens. Most of those then present remembered the old ring of his fervid eloquence. He attended the Annual Meeting on 23rd May 1881, at the contested election of President, on which occasion I understand he refrained from voting. This was the last time we saw our friend in these rooms. He was then in the 86th year of his age.

The interesting remarks and information afforded during the discussions on the Papers read by other contributors; and the announcements made at the Ordinary Meetings, as Secretary for Foreign Correspondence, are printed in the Sessional Papers and in the Notices of the Meetings. Besides all these numerous contributions, we are also indebted to him for various *Biographical Memorials* of great interest of our members and others. The chief ones comprise:—1837, Sir John Soane; 1837, J. N. L.

Durand, of Paris ; 1838, Thomas Lee ; 1839, C. Percier, of Paris ; 1840, S. and L. Gasse, of Naples ; 1840, T. Archer ; 1842, A. J. M. Guénepin of Paris ; 1842, G. L. Bernini ; 1854, Leclère, Visconti, and Gau ; 1856, the Commendatore Canina ; 1857, Louis de Zanth ; 1862, C. P. Nepvue, of Versailles ; 1863, J. B. Bunning, and William Cubitt, M.P. ; 1864, Joseph Woods ; 1864, David Roberts, R.A. ; 1865, the Duke of Northumberland ; 1865, J. M. Lockyer ; 1865, John Davies ; 1867, Charles Fowler ; 1867, J. I. Hittorff ; 1867, F. Duban ; 1867, Sir Robert Smirke ; Lord Llanover, better known as Sir Benj. Hall ; 1870, William Burn ; 1870, Commendatore Poletti ; 1870, Raffaele Politi ; 1872, Louis Vaudoyer ; 1877, Thomas Bellamy ; and 9th June 1879, Gottfried Semper ; besides several given in his two "Annual Addresses," those in the Annual Reports of the Council, and on other occasions. He was the Editor of the first part of the first volume of the "Transactions of the Institute," of which the proofs, with corrections in his handwriting, were presented to us a few years since by the printer, Mr. Davy ; and I consider he was likewise so of the second part. He contributed constantly and liberally to the several Funds ; to the Removal Fund in 1859 ; to the Travelling Fund, which was peculiarly his own ; besides the greater part of the expenses of a *Conversazione* held during his presidency.

This then is the man, who, in the "obituary" of one of the popular "High Art" periodicals published in September last, was thus noticed :—"The death is announced "of Thomas Leverton Donaldson, the archaeologist, author of 'Pompeii,' 1827 ; a " 'Selection of Ornamental Sculptures ;' and 'Doorways,' 1833 " ! These lines must have been written by some young member of the present overcrowded literary department, and they prove that, whatever position a man may occupy during life, his memory is soon obliterated by a retirement from active duties or pursuits ; for it is a fact that several, who had known Mr. Donaldson, were not aware of his being alive in the early part of August of last year ! And now, let us consider the man as we found him in this Institute—the member, Secretary, President—the Father. Donaldson has been well described by one of his friends, a member also, of long standing, "as a most "indefatigable writer and speaker, to whose entranced intelligence the study of "architecture was a worship, and its miraculous origin in far antiquity a faith that "never could be shaken ;" and, "of Professor Donaldson, I need only say that so far as "a high-minded and fearless maintenance of the lofty character of our splendid art and "its literature, and of the honourable historical position of our artists, antiquarians, "and critics, could defend us against assault, whether vulgar or refined, he never for an "instant swerved from his duty as leader of the guild."¹⁷

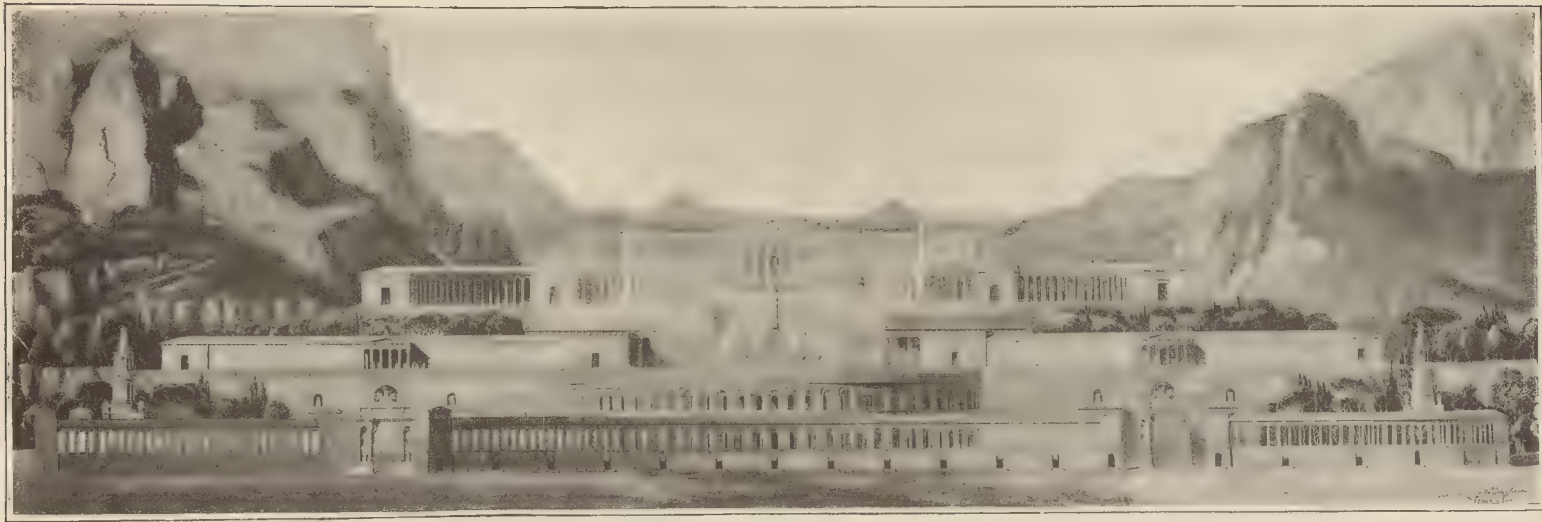
For the period I have gone through, or for nearly forty years of it, Donaldson was the life and soul of our Institute. He had been the founder, for all others owned themselves his coadjutors ; he continued to be its prime mover, for all accepted his leadership to the last. His opinions were not always our opinions, but his policy was our policy,

¹⁷ Professor Kerr. See the *TRANSACTIONS*, 1883-84, pp. 219-21.—W.P.

because his heart was our heart. When he left us our blood ran slow ! Throughout the civilized world his name is still our name, and his fame our fame. He made the influence of English art felt abroad. That influence, administered by his generous hand, was ever generous, expressed by his genial life, luminous in his bright and earnest eyes. Well may we be proud of him ! for all his pride was in us, and when the filial homage of to-night is conveyed by our TRANSACTIONS, not only to every English-speaking community throughout the globe, but to the great Cities and Academies of the world, the universal brotherhood of our profession will rejoice in the remembrance, and regret the loss of a colleague so worthy of its approbation and applause. In all Europe there is not a Body of Architects which has not in him lost a member. His activity as a correspondent was irrepressible ; his enterprise omnipresent ; his earnestness provoking earnestness everywhere ; his unwearied industry compelling everywhere industrious response. But it was in our own Hall that he was truly at home. Who can forget the inexpressible charm of his manner, lighting up the whole assembly with sympathetic lustre ; the effervescence of his loquacity, maintaining a continual glow of expectation ; the unaffected pleasantries of his wit and humour, never breaking bounds, and inspiring all ; that guileless adoration of his art, which regarded its great monuments like the great stars of heaven, and the knowledge of their secrets as the one thing worth living for ! If he announced a book, it became a gift of price ; if he exhibited a specimen or a relic, it became a curiosity that every one must inspect with interest ; if he introduced a visitor, it was to claim for him distinction and the welcome of a friend ; if he administered a rebuke, or even resented an injury, it was done with a simple-minded dignity and an unoffending authority all his own.

But what was the particular excellence of Donaldson's policy in this Institute, and on its behalf ? Its liberality ; its essential reliance upon every one's good sense and good faith ; its trust ; its frank acknowledgment and unreserved encouragement of independent opinion ; every architect of fair fame who came into this room was to him a man of intelligence and honour. His very failings leaned to virtue's side ; even his impulsiveness—the *perfervidum ingenium Scotorum*—who does not remember the graciousness of it ; its indignation without anger, its self-assertion without self-conceit, its frown passing in a moment into a smile ? In a word, who that has taken Donaldson by the hand can forget how kind, and true, and honest was the grasp ? Fertile as nature is in producing men for the time, when such men pass away, the feeling may well be excused that we shall never look upon their like again.

WYATT PAPWORTH.



AN IDEA FOR A TEMPLE OF VICTORY ACCORDING TO THE ANCIENT USAGES.

[Redrawn from the original sepia drawing by Professor Donaldson.]

Back of
Foldout
Not Imaged





AN IDEA FOR A TEMPLE OF VICTORY

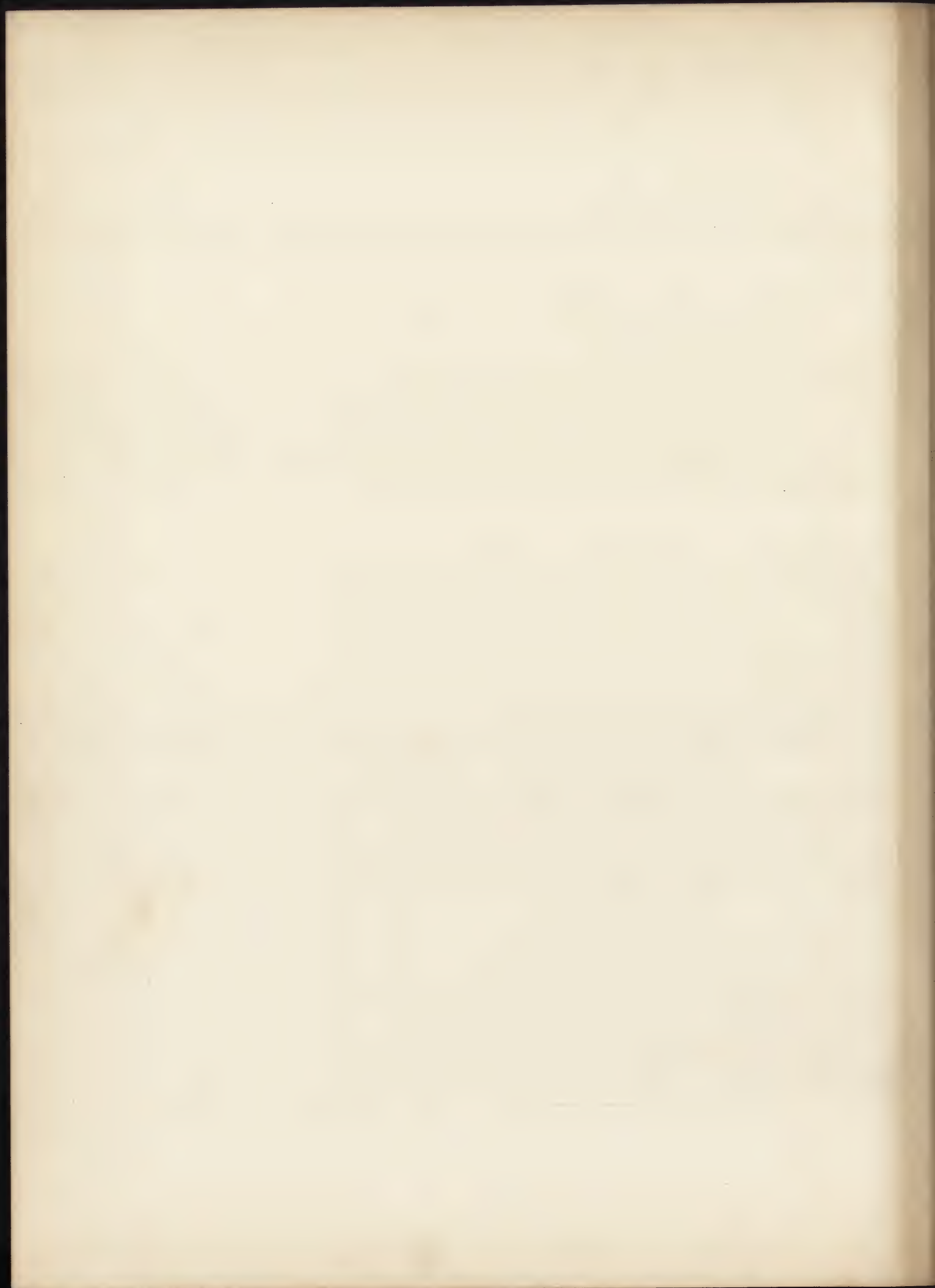
[Reduced from the original sepia

PROFESSOR DONALDSON (xxvi.)



ACCORDING TO THE ANCIENT USAGES.

[Drawing by Professor Donaldson.]







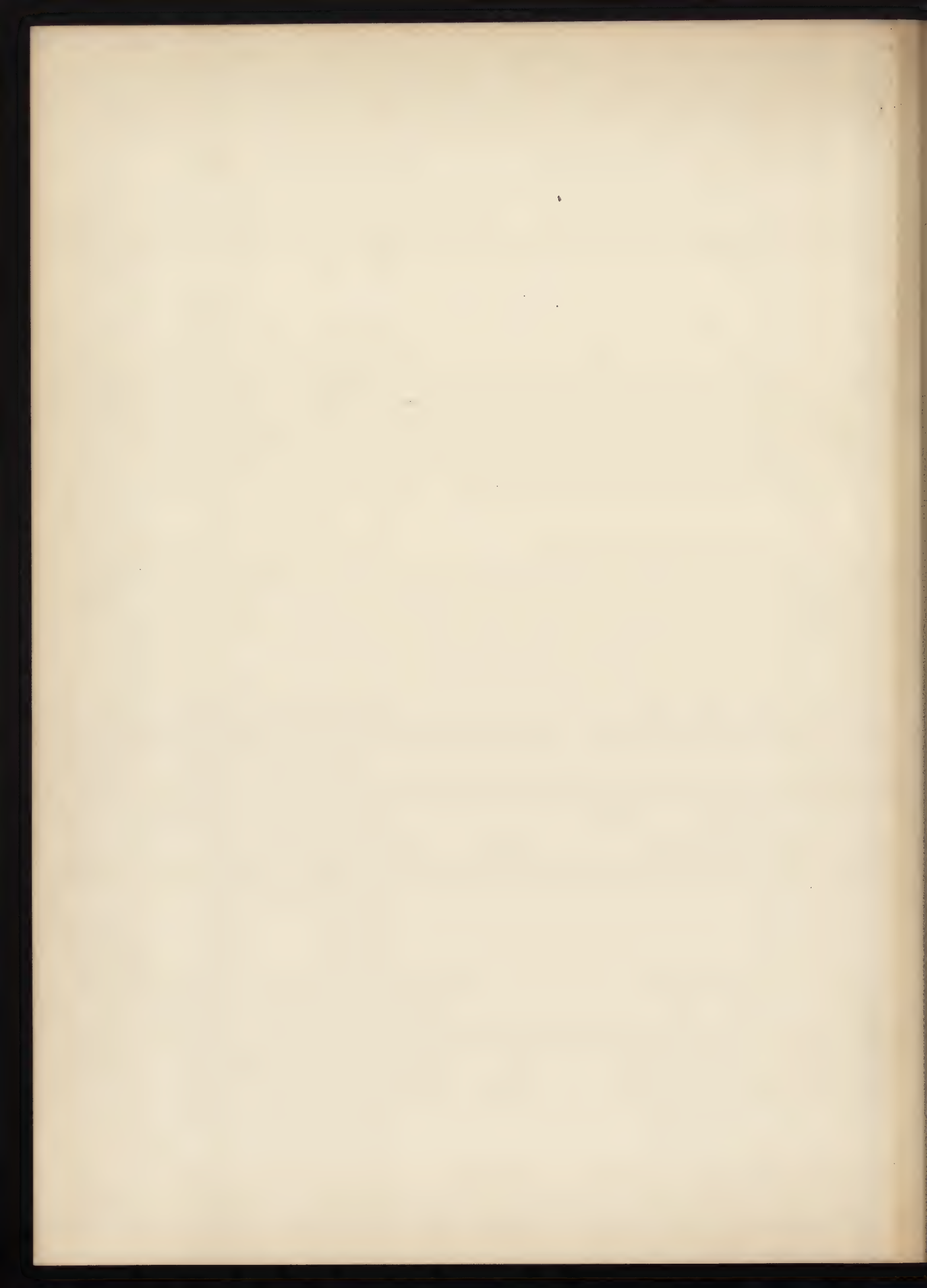
C.F. Kell Photo-Lith. 8 Castle St. Holborn, London E.C.

THE LATE PROFESSOR DONALDSON'S COMPETITION
(EXTERIOR VIEW REDUCED)

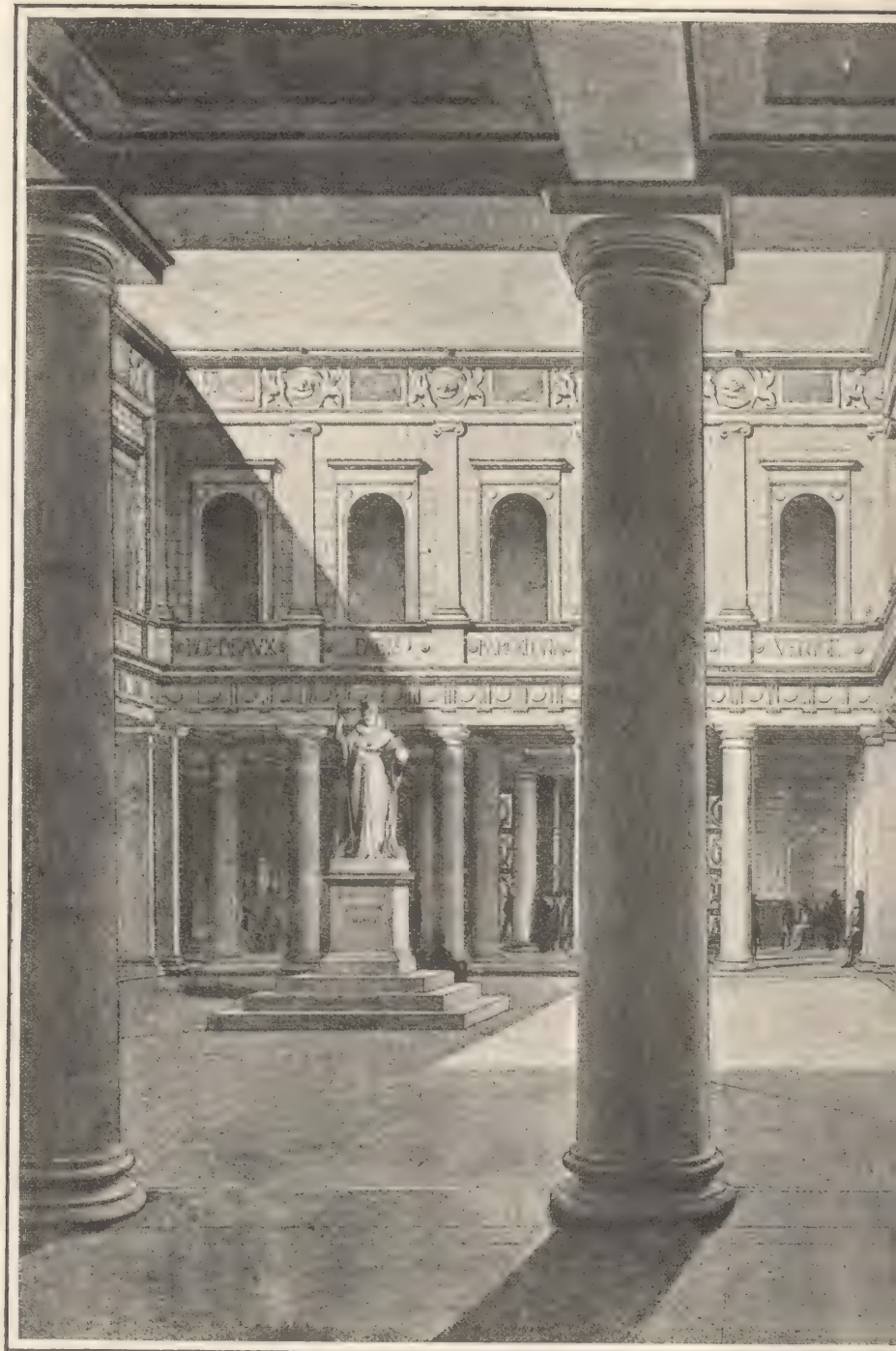


PROPOSED DESIGN FOR THE ROYAL EXCHANGE 1839.

(FROM THE ORIGINAL DRAWING.)







THE LATE PROFESSOR DONALDSON'S COMPE

[Interior of Quadrangle, re



SECTION DESIGN FOR THE ROYAL EXCHANGE, 1839.

[Redrawn from the original drawing.]



XVII.

SWEDISH BUILDING LAW.

By Mr. ALEXANDER BEAZELEY, M.Inst.C.E. (Librarian).

[Read on Monday, 15th February 1886, Alfred Waterhouse, R.A., *Vice-President*, in the Chair.]

THE Building Law of Sweden is defined by a Royal Ordinance that came into operation 1st January 1875 and Building Regulations framed in accordance therewith by the municipal authorities of each town. Of these, a good deal is occupied with matters relating to procedure and other (to us) unimportant details. In the following abstract of the Ordinance I shall give *in extenso* such portions only as contain matter of practical interest to ourselves, and I shall then proceed to consider the chief points of the Municipal Building Regulations.

THE BUILDING ORDINANCE.

Chap. I. prescribes the framing and publication of Building Regulations by the local authorities; the constitution, functions, and procedure of a building committee for each town, and authorizes the infliction of fines for breaches of the Ordinance or the Building Regulations.

Chap. II.—§§ 1-11 require plans of each town, to a scale of $\frac{1}{2000}$, to be prepared, showing streets, &c., and heights and slopes of ground, and accompanied by proper descriptive text. When new ground is laid out for building, a plan of the proposed new district is to be prepared, and submitted for approval of the Crown. Building is not to be extended to districts for which there is no authorized plan.

§ 12 provides that, in laying-out a town, or a new building district in a town, the following points (among others) are to be attended-to:—

Streets, squares, quays, &c., to be spacious and suitably placed.

Broad avenues, and plantations, to be laid out as extensively as possible.

Building-plots to be of suitable dimensions; and, where possible, space to be reserved for gardens in the rear of the houses and for planted forecourts in the front. Spaces so reserved are for ever incapable of being built-upon or diverted to other purposes, and their neat and orderly maintenance devolves on the owners.

§ 13. (1.) Streets in general not to be laid out with a less width than 58 ft. 6 in., reckoned between the building-lines. In exceptional cases streets of small length may be laid out with a minimum width of 39 ft., but satisfactory reasons for the proposed reduction must be assigned when the plan is submitted for approval.

(2.) Roadways of avenues, and streets intended to have buildings on one side only and on the other to be bounded by a park, square, or other public place, and streets bordered by forecourts in which the width between building-lines is not less than 58 ft. 6 in., may be laid out with a width of 39 ft.

§ 14 defines the meaning of a "new town" and "new town-quarter."

§§ 15-16 authorize improvements, either immediate or gradual, to be made in existing towns.

Chap. III.—§§ 17-19 deal with the subdivision of building-blocks into building-plots, and the rectification of faults of dimension and shape.

§§ 20-21 require a map of existing, new, and altered plots to be prepared, and proper supervision exercised as to the maintenance of boundaries.

§ 22. Levels to be taken, and a connected scheme of surface-drainage to be approved before any building operations are commenced.

§§ 23-25 relate to yard-spaces. Yard to be at least half as large as the area occupied by the buildings, and not less than 1898 sq. ft. Principal portion to be not less than 39 ft. wide, and passages, &c., not less than 14 ft. 6 in. wide. A building must therefore be placed either against the boundary of its plot or at least 14 ft. 6 in.¹⁸ distant therefrom. No windows of dwelling-rooms to open on to any portion of a yard less than 39 feet wide. Owners of adjoining plots may agree to lay out in common one yard-space of 39 feet wide. Provision is to be made in Building Regulations for improvement of existing yards. In determining area of yard-space, nothing to be included except what is directly connected therewith as such. Hence, a small yard separated from the main one wholly or in chief part by buildings, and the gardens and forecourts mentioned in § 12, must not be included in the estimate.

§ 26 requires buildings facing a street to be erected on the building-line shown on town plan. But a house may be set back within that line if sufficient space be left for future building in front of it; and Building Regulations may authorize other deviations from the general rule.

§ 27 requires that the provisions of the General Sanitary Ordinance shall be observed in the erection and fitting up of buildings.

§ 28. (1.) A dwelling-house may not be built with more than five storeys, including the ground floor. If there be dwelling-rooms, or rooms with fireplace, in the roof, this counts as a storey.

(2.) In a new town or town-quarter a building may not be erected of a greater height than the width of the street on which it stands, with 4 ft. 10½ in. added. A

¹⁸ The distance here specified as a minimum is variously modified in some of the Building Regulations. See pp. 120, 122, 123.—A.B.

house at the corner of a wide and a narrow street may not have a frontage to the latter of more than 58 ft. 6 in. carried up to the height allowed on the wider street. A building on the inner part of the plot may not be erected of a greater height than the width of the yard belonging to the building, with 4 ft. 10½ in. added.

(3.) Provision shall be made in the Building Regulations concerning the matters mentioned in par. 2 of this section, applicable to old town-quarters, and such provision must be as far as possible in accordance with what is required for a new town-quarter.

(4.) A building which towards a street or open place is of the maximum height allowable for its situation, may not be of a greater height towards the yard.

(5.) By the height of a building is meant its mean height, reckoned from the street or yard whose width regulates the height, up to and including the cornice or eaves. By the width of a street is meant the distance between the building-lines.

§ 29. A corner building hereafter erected on a street or public place shall have the corner vertically cut off so that the face of the chamfer shall be at least 7 ft. 9½ in. broad and form an equal angle at each side; or the corner may be rounded, in which case the curve must not project more than 12 inches beyond the above prescribed line of chamfer. Where special weighty reasons exist, the Building Committee may sanction a deviation from this rule.

§ 30. A building may not be externally painted of pure white colour, but the colour must be such as to be not injurious or offensive to the eyesight.

§ 31. When cellars are constructed under a dwelling-house, they shall be walled with stone or brick and preferably vaulted. Cellars shall be so constructed as to be as far as possible free from damp.

§ 32. Dwelling-rooms hereafter constructed shall have their floor laid at least 12 inches higher than the adjoining ground surface.

The height of dwelling-rooms may not be less than 8 ft. 9 in. from floor to ceiling. The Building Regulations may, however, authorize the giving to dwelling-rooms in the roof a height of only 7 ft. 9½ in.

§ 33. Churches, schools, town-halls, hospitals, theatres, buildings containing music-halls or dancing-saloons, factories, and other buildings intended for the assemblage of large numbers of people, shall have their exits (as well as their stairs and lobbies where there are such) of a number and width adapted to the number of persons the place will contain; and all the doors shall be arranged to open outwards.

§ 34. A building of stone or other equally fireproof material may be erected against the boundary of the adjoining plot. Other buildings may not be erected within 14 ft. 6 in. of the boundary unless provided with a fireproof wall or other satisfactory protection against fire as may be specified in the Building Regulations. In cases where there is no house on the adjoining plot nearer to the boundary than 14 ft. 6 in., Building Regulations may allow the erection of a fireproof wall to be delayed until the adjoining plot is built-upon up to the boundary, on condition that a foundation be laid for the fireproof wall and space left for its erection.

§ 35. (1.) A building may not be roofed with straw, turf, shingles, boards, or other

inflammable material, but roofing shall be of tiles, slate, sheet metal, or other material which is found to be a safeguard against danger of fire.

(2.) In the event of there being special reasons in the case of any town for somewhat relaxing the rule contained in par. 1 of this section, it may be so provided in the Building Regulations; but the regulation on that point shall be submitted for approval of the Crown.

§ 36. (1.) Chimneys and fireplaces, with the pipes and flues thereto appertaining, shall be detached in a suitable manner from woodwork and other easily ignitable material employed in a building.

(2.) In other respects, the Building Regulations shall contain the necessary provisions to be observed in the erection of buildings as precaution against fire, and special rules must be laid down respecting establishments liable to take fire.

§ 37. (1.) A new building may not be erected, nor alterations equivalent to rebuilding of an old one be carried out, without permission from the Building Committee. Application for permission must be accompanied by drawings of the building as required by the Building Regulations. There shall also be a description of the drawings, as well as a map of the plot showing the proper situation and extent of the building.

§ 38. Building Committee to see that proposed buildings are adapted to the sites on which they are to be erected, that they answer sanitary requirements and safety against fire, and that they satisfy reasonable requirements as regards taste and beauty. If a building be not erected within five years after it has been sanctioned, the permission lapses.

§ 39 provides that, before the Building Committee give permission to build, the building-line of the street shall be determined and the boundaries of the plot (if necessary) altered in accordance therewith. Level of street, and questions relating to surface-drainage, to be also determined.

§ 40. The Building Committee shall attentively watch the building works, and take care that every building is situated on the place assigned to it, and that the drawings and conditions in other respects also are observed.

§ 41. When a building has been erected, it shall be marked out as to its proper place and extent upon a map of the town kept by the Building Committee on which also the plots are shown; the material chiefly used in the construction of the building is to be indicated by a special colour or in some other suitable manner.

§ 42. Building Regulations shall contain the requisite provisions concerning repairs and alterations of houses, and especially whether and to what extent, in reference to such repairs or alterations as are not equivalent to rebuilding, permission is required from or notice of the work has to be given to the Building Committee.

§ 43. Permission from the Building Committee to undertake building operations is not required for government buildings under the charge of the Chief Superintendent of Works, nor for other public buildings the drawings for which, according to existing enactments, require the approval of the Crown; but notice of the building operations shall, before the work is commenced, be given to the Committee, who must see that the

building is placed in the position assigned to it, and observe the provisions of sections 39 and 41.

§ 44 sanctions the introduction into Building Regulations of provisions of increased stringency.

Chap. IV.—§ 45. (1.) Any person who undertakes any building work without leave from the Building Committee where such leave is required by this Ordinance or the Building Regulations, or without giving notice to the Building Committee where such ought to be given, or carries out any building work at variance with the approved drawings or the instructions issued by the Building Committee, shall be fined not less than five shillings nor more than £28, and shall in addition be obliged at his own cost to alter the executed work if the Building Committee find it necessary so to direct. When a building is laid out in a manner at variance with the rules as to the level of the street or the plot, or the foundations, the owner is also answerable for any damage which may thereafter be occasioned to the property by the raising or lowering of the street.

(2.), (3.), and (4.) relate to the levying and application of fines.

§ 46 relates to legal proceedings arising upon Building Regulations.

§ 47. (1.) Any person who considers that his rights are invaded or unduly limited by the provisions of Building Regulations as approved by the Provincial Governor, may appeal against the same within the time fixed for appeal against the decision of a department or a local authority; but the Building Regulations shall nevertheless be observed until the matter be otherwise decided by due authority.

(2.) An appeal from the decision of the Building Committee may be lodged with the Provincial Governor within thirty days after the decision is announced.

§ 48. (1.) If the building owner does not employ an architect to conduct or superintend the work, and does not before the commencement of the work deliver to the Building Committee in writing the name of the architect whom he so employs, together with a written declaration from the latter that he undertakes the responsibility of the duty, the owner has to be answerable for the execution of the work in accordance with this Ordinance and the Building Regulations and the instructions issued under them.

(2.) If the building owner who as aforesaid employs the assistance of a responsible architect, opposes the observance of what is prescribed in this Ordinance or the Building Regulations, the architect must explain the matter clearly to him, and, if he will not conform himself, the architect must notify the affair to the Building Committee, and the owner shall accordingly be himself responsible for the consequences.

§ 49 requires Provincial Governors to see to the enforcement of this Ordinance and of the Building Regulations when framed, and to report to the Crown any remissness on the part of the local authorities; and provides that non-corporate towns, ports, fishing-villages, and other places having a considerable and dense population, may from time to time be brought under the operation of this Ordinance.

The Building Regulations, based upon the foregoing Ordinance, vary much in various towns with regard to matters of detail, as might be anticipated from the fact that

conditions of climate, situation, available building materials, and a multitude of other circumstances, differ widely in a country so extensive as Sweden. To enter minutely into these varieties of detail would extend this paper to too great a length and be alike useless and tedious. I shall therefore deal in a general way with the Building Regulations under the several principal heads to which they refer, and endeavour to give a summary view of their scope and character. Where great diversity exists it will be briefly noticed; and variety in specified dimensions &c. will be given as forming a maximum and minimum limit, even though the dimension may be absolutely fixed in each several town.

A. *Building-Plots.*—A building-plot may not be divided into two or more, nor a part of it transferred to an adjoining plot, unless the new plots formed by the division, or the remainder left after transfer of a portion, contain at least from 3,795 to 9,489 sq. ft., and have at least 58 ft. 6 in. frontage to a street or public place.

A plot whose frontage is less than 49 ft. and its area less than from 2,847 to 9,489 sq. ft., may not, if the buildings on it be burned or pulled down, be again built upon until it has been decided whether or not the ground shall be purchased by the town for improving and equalising the area or dimensions of plots. But a plot having a frontage of 49 ft. and upwards, even if its area be less than from 2,847 to 9,489 sq. ft., is not subject to compulsory sale, and may be built upon if the building occupies the whole area of the plot.

The owner of a plot is to have it properly levelled &c., so as to carry off water and prevent the accumulation of damp.

Plots are to be fenced between each other, fences to be not less than 6 ft. 10 in. nor more than 11 ft. 6 in. high. Owners to divide the expense, the share of each being reduced in proportion to the extent of boundary fenced by his own buildings. If owners agree, they can obtain permission to leave their plots open to each other. If they differ about the kind of fence to be erected, the Building Committee is to decide the question.

Plots are to be fenced towards a street or public place; fence to be not less than 2 ft. 5 in. nor more than 9 ft. 9 in. high, and to be neat and suitable.

B. *Streets.*—In no item do the Building Regulations of the several towns differ from each other more widely than in that of the formation, paving, and maintenance of roadways and side-walks of streets, the expense of which is in some cases defrayed by the town, in others by the owners of the frontage, and in others again conjointly by both.

In Stockholm and Gothenburg, the two principal cities of the kingdom, the Building Regulations contain no definite statements on the subject; and since, in those of some of the other towns, it is provided that the matter is to be regulated "according to present or future law," it is probable that local custom or legislation had dealt with the question prior to the promulgation of the Ordinance of 1875, and that the special provisions (where such exist) of the several Building Regulations do but confirm or slightly modify what was already in vogue in the several localities. From these heterogeneous data it is of course impossible to compile a digest correctly representing the whole existing law of the case; but the following gives a general notion of it, and does not fall very wide of the mark in any particular.

Side-walks are to be from 5 ft. to 7 ft. 9 in. wide in streets, and 9 ft. 9 in. on squares and open public places. But the minimum width of roadway is to be from 17 ft. 6 in. to 23 ft. 5 in. Slope of roadway from centre line to gutter, and of side-walk from building-line to curb, to be 1 in 50. Side-walk is not to be broken into by carriage-entrances, &c., but the gutter is to be properly bridged where necessary to allow vehicles to cross the side-walk.

Where the owner has to form or pave, &c., his liability extends to the centre of roadway in the case of a street, and 20 ft. outwards from his frontage in the case of a square. His expense is, in some instances, reduced by a proviso that if the formation of a street requires more than 6 in. of cutting or embankment the town pays for all excess; and in some Building Regulations he is liable only for the first cost of forming and paving, subsequent maintenance and repair devolving upon the town.

Where the whole expense is defrayed by the town, as for example in Örebro, the authorities are not obliged to form, pave, or maintain a new street until it is actually built upon, and then only so far as building has extended, unless the ground for such street be given free of cost by the owners in a continuous connexion with streets already formed.

c. *Projections upon or over street.*—Steps, whether ascending or descending, are in Stockholm prohibited from being constructed to project beyond building-line, and all existing ones projecting are to be removed within a twelvemonth from date of Building Regulations. In other towns, steps ascending from the street may project from 1 ft. to 2 ft. 11 in., but some Building Regulations require them to be reduced or removed under certain circumstances. Descending steps are, in some places, absolutely prohibited, in others they are required to be securely fenced, and in others again their projection must not exceed 1 ft. 11 in. The wording of the Building Regulations is not always perfectly clear; but in some of them (Stockholm included) it seems that in exceptional cases, where the architectural exigencies of an ornamental entrance render it necessary, the Building Committee may grant special sanction for the projection of ascending steps, the maximum limit being fixed at 1 ft. 6 in.

Plinths, &c., may not project more than 3½ in., and then not continuously, and only on the wider streets.

Balconies, Bay Windows, &c., may not project more than 3 ft. 10 in., and must be of stone, cement, or metal, and subject to such conditions of strength as may be required by the Building Committee. The clear height above the ground is variously required to be from 6 ft. 10 in. (Gothenburg) to 13 ft. 8 in. (Stockholm), the average of the various heights specified being about 9 ft. 4 in.

Bridges. No bridge may be thrown over the street from house to house; and existing ones must be finally removed when they require repair.

d. *Yards.*—Where the ground is not wholly occupied by a single building, the yard-space must equal at least from one-fifth to one-third the area of the building. In the most closely built parts of the town, and in the case of corner lots, special exception may be made by the Building Committee.

Yards which equal one-third of the area occupied by the building may have one-third of their own area occupied by outhouses not exceeding 11 ft. 8 in. high, and yards which equal one-fourth of area of building may have one-fourth of their own area similarly occupied.

Lighting-areas, if open to the sky, must be in plan not less than from 35 to 61 sq. ft. and of not less dimension on any side than 5 ft. 10 in. If of less than 35 sq. ft., such area must be covered-in. All must have asphalted or cement floor, and an entrance from ground floor provided with a grated door. They must not contain any building of any kind.

E. *Foundation walls*.—Walls, chimneys, and staircases must rest on foundation walls or on arches or iron girders resting on foundation walls.

The bottom for footings to be of such depth and prepared in such manner as in the opinion of the Building Committee may be required by the nature of the ground; and, except on rock, not less than 3 ft. 10 in. deep for brick houses and 2 ft. for timber houses. Foundation walls at bottom to be of the following thickness:—

Depth 6 in.	...	...	...	...	2 ft. 11 in.
„ 6 in. to 3 ft. 10 in.	...	...	...	...	3 ft. 10 in.
„ 3 ft. 10 in. and upwards	...	...	...	...	4 ft. 10 in.

and to be battered or stepped so as to be not less than from $9\frac{1}{2}$ in. to $11\frac{1}{2}$ in. thicker than the superimposed wall. Top of foundation wall of dwelling-houses to be not less than from $11\frac{1}{2}$ in. to 1 ft. $11\frac{1}{2}$ in. above surface of ground. Approved damp-course to be laid.

F. *Height of Buildings and Thickness of Walls*.—In new quarters, buildings may not exceed 66 ft. in height, excepting churches and other public buildings.

In old quarters, the maximum height of building, and number of floors, is as follows:—

Width of Street.	Maximum height of Building.	Maximum No. of Floors.
32 ft. and less	43 ft.	3
32 ft. to 44 ft.	54 ft. 6 in.	4
44 ft. and upwards	66 ft.	5

Buildings on a yard, if more than 58 ft. 6 in. back from building-line, are not to be higher than the width of yard with one-fourth added. But the wings of a building that faces on a street, may contain the following number of floors, if they be not higher than the corresponding floors of main building:—

Width of Yard.	No. of Floors.
14 ft. 7 in. to 24 ft.	2
24 ft. to 32 ft.	3
32 ft. and upwards	4

Where a street is intended to be widened, though this be not yet executed, buildings on it may be of the height answering to the destined increased width.

Dwelling-houses shall have their own exterior walls on all sides. Exterior walls (and partition walls where carrying joists or chimneys) to be of the following thicknesses for buildings of the following number of floors :—

One Floor.	Two Floors.	Three Floors.	Four Floors.	Five Floors.
9½ in. to 1 ft. 5½ in.	One 1 ft. 2 in. to 1 ft. 5½ in. One 9½ in. to 1 ft. 5½ in.	One 1 ft. 5½ in. to 1 ft. 11½ in. One 1 ft. 2 in. to 1 ft. 5½ in. One 11½ in. to 1 ft. 5½ in.	One 1 ft. 10 in. to 2 ft. 5 in. One 1 ft. 5½ in. to 1 ft. 11½ in. One 1 ft. 2 in. to 1 ft. 5½ in. One 11½ in. to 1 ft. 5½ in.	One 1 ft. 11¼ in. Two 1 ft. 6½ in. Two 1 ft. 2 in.

Partition walls not carrying joists or chimneys may, where sanction is obtained, be of woodwork boarded on each side, provided both sides be plastered with lime-mortar.

Where it is proposed to raise upon an existing building, the Building Committee is to determine whether the existing walls are thick enough and in other respects suitable.

The total width of openings in walls on each floor may not exceed seven-tenths of length of wall ; and all openings must be arched in brick or have iron brestsummers.

No cellar may be used as a shop or other place in which people live during the greater part of the day, if its floor is more than 3 ft. 5 in. below surface of ground ; nor unless it is dry and light, with proper means of ventilation, and provided with a wooden or asphalte floor and a suitable fireplace.

No dwelling-room, whether with or without fireplace, nor a kitchen, may be placed in the roof of a house of more than four stories ; nor in any house unless provided with a fireproof floor. Such rooms must not be placed on the collar-beams of roof, nor occupy a total area exceeding one-third of the garret floor. They shall be not less than 7 ft. 9½ in. high in the clear, and must where possible be shut off from the rest of the garret floor by brick walls.

A dwelling-house newly erected, added-to, or raised-upon, may not be plastered externally within six months after the exterior walls are built, under penalty of a fine and of obligation to immediately remove the plaster.

G. *Fireproof Walls*.—Unless founded on rock, footings of fireproof wall to be not less than 5 ft. 10 in. below surface, including depth of artificial bottom where required. Thickness of foundation wall to be the same as mentioned under "Foundation walls."

Above foundation wall, thickness to be as follows :—

One to Three Floors—1 ft. 1½ in. to 1 ft. 5½ in.

Four Floors—Ground floor, 1 ft. 11½ in. to 1 ft. 5½ in.; above ground floor, 1 ft. 11½ in. to 1 ft. 1½ in.

In loft, thickness of wall to be from 9 in. to 11½ in., and above roof 9 in. Where it is 9 in., it is to have counterforts 4½ in. thick and 1 ft. 1½ in. wide, not more than 8 ft. 9 in. apart.

To rise $11\frac{1}{2}$ in. above the roof of the higher of the houses which it separates, and to be coped and sheathed with sheet-iron.

If it carries no joists, and is built against another one which it does not overtop more than 3 ft. 10 in., it may be diminished on each floor by $4\frac{1}{2}$ in., but so that the joint thickness of two adjoining fireproof walls be nowhere less than 1 ft. $11\frac{1}{2}$ in.

It must contain no flues in its thickness: if flues be built against it they must have their own walls all round.

Joists must not be let more than $5\frac{3}{4}$ in. into a fireproof wall, and joists entering on opposite sides must be separated laterally by at least from 4 in. to 6 in. No joists to be inserted in a fireproof wall that is less than 1 ft. $5\frac{1}{2}$ in. thick.

In some Building Regulations, openings in fireproof wall are absolutely prohibited. In all cases they are subject to stringent conditions.

H. *Chimneys and Fireplaces.*—Chimneys to be built of brick, well pointed and plastered. To be supported by a basement wall, a gable, a partition wall of at least 1 ft. thick, or upon an arch between two walls; and, where carried by a wall, must not project beyond it more than 3 in. on each side. Upon two walls intersecting each other at right angles several flues may be carried, according to circumstances.

A chimney deviating from the perpendicular must be sufficiently supported by a brick arch or wall along its whole length, unless the gathering-over does not exceed one-third of its external dimension.

A chimney standing against an adjoining party wall shall rise at least 2 ft. 11 in. above the top of the same. If any person desires to build higher his own party wall against which his neighbour has a chimney, the latter shall within one month after notice build his chimney at his own expense 2 ft. 11 in. above the top of such wall as raised, with the right of securing the work to such wall. A chimney distant less than 19 ft. 6 in. from a wooden house, or less than 9 ft. 9 in. from the nearest house built of other materials, must be 2 ft. higher than the ridge of that house.

Chimneys passing through a roof are to do so as near as possible to the ridge, to rise at least 2 ft. 11 in. above it, and to be sheathed with sheet-iron where they pass through the roof. A chimney passing through any other part of the slope of a roof must be of such a height that its top is everywhere 3 ft. 11 in. clear of the nearest part of roof. Where the design or general construction of the building requires it, the Building Committee may permit a chimney to be carried up at the eaves, provided it be raised to a suitable height and made reasonably ornamental; but in this case the roof must be plated with sheet-iron or other fireproof material.

Where a chimney passes through joisting or roofing the thickness of its walls must be increased $4\frac{1}{2}$ in., and no woodwork is anywhere to be let into a chimney unless at least $11\frac{3}{4}$ in. distant from the flue.

No flue of any kind may project outside a wall towards the street; but the Building Committee may allow this towards a yard if the flue be of brick and there be no danger of fire. No flue may be led out into the open air through a window or a wall, without Building Committee's special permission, but must be led into a chimney.

External walls of chimneys to be at least 6 in. thick, and divisions between flues to be at least 6 in. thick against an ascendable one and at least 3 in. thick against an ordinary one. Thickness of chimneys to steam-boilers, &c., to be regulated according to height and description of chimney. Fireplaces and chimneys in which great or constant firing goes on, must have thicker and more carefully plastered walls than ordinary ones and be detached on all sides.¹⁹

Internal dimensions of flues to be as follows:—For kitchen grates, not less than $11\frac{3}{4}$ in. one way and 1 ft. $2\frac{1}{2}$ in. the other [in many Building Regulations 1 ft. 5 in. square]; and for other stoves not less than 6 in. square. Kitchen stoves to have a hood of stone or metal, and, unless they have an open chimney over them, they must have two flues, each from 6 in. to 8 in. square, the one for smoke and the other for steam and vapour from the cooking. New houses to have a separate flue to each fireplace; but a chimney with an ascendable flue having an internal dimension not less than 1 ft. $5\frac{1}{2}$ in. square or corresponding sectional area, may be built to receive the flues from several ranges, grates, or stoves. Such chimney to be built up from the ground, and provided at bottom with a fireproof soot-chamber of brick having a proper aperture secured by double doors of iron in iron frames. Some Building Regulations allow one flue to be common to several fireplaces if, for each fireplace, its internal dimensions be increased by $1\frac{3}{4}$ in. on each side.

Iron bars, draw-dampers, &c., which interfere with sweeping, are not to be set in a flue; existing ones to be removed, and a hinged or a top-damper to be substituted for draw-damper.

No fireplace may be built upon wooden joists unless it have a base, at least 1 ft. $5\frac{1}{2}$ in. high for kitchen fires and $11\frac{3}{4}$ in. high for ordinary stoves, between the bottom of fireplace and top of joists. In all other cases the wooden joists must be cut off and trimmed, and their place supplied by iron joists on which the fireplace may be built. No brick or tiled stove may be set midway upon joists having a longer span than 12 ft. 8 in. unless specially supported.

No fireplace may be built within 1 ft. of a wooden wall. Fireplaces to have a stone hearth at least 1 ft. $5\frac{1}{2}$ in. wide for cooking stoves and $11\frac{3}{4}$ in. wide for ordinary stoves. Cast-iron hearths may be used for small stoves standing on iron feet.

Open fireplaces may not be used in a garret, nor any kind of fireplace unless the garret has a fireproof floor. Under no circumstances may there be any fireplace in the garret of a house of more than four floors, garret and ground floor each counting as a floor.

Metal stove-pipes must not be led through any part of a room except by special permission and under special conditions of the Building Committee.

Regulations as to the foregoing matters apply to existing as well as to new buildings; and should any existing ones be found to be dangerous, the Building

¹⁹ Some remarkable details of the effect of long-continued moderate heat in rendering wood highly combustible, and even charring it, are given in a Sessional Paper, read 3rd April 1865, by Professor T. Hayter Lewis, F.S.A., *Past Vice-President*. See the *TRANSACTIONS* 1864-65, pp. 111, 124.—A. B.

Committee is to forbid their further use and fix a time within which they are to be removed and amended.

I. Doors and Gateways.—Except in the case of the buildings mentioned in § 33 of the Building Ordinance, gates and doors must not open outwards so as to project beyond face of wall. But shops, &c., may have doors opening outwards, so arranged as to fasten flat against face of wall and not interfere with traffic in the street.

Houses on a street or public place must have a gate or entrance-door giving unobstructed access to the yard and to the (hereafter mentioned) fireproof stair to loft. In the case of corner houses, the Building Committee shall determine whether more than one such entrance is necessary. Large houses must have gateway at least from 6 ft. 10 in. to 7 ft. 9½ in. clear width: smaller houses, where there is neither space nor need for a gateway, to have doorway not less than 3 ft. 11 in. clear width. Where the building does not occupy the whole frontage, the Building Committee may allow the gateway or doorway to be in wall of yard. If a yard be divided by a building across it, there is to be a passage of same width through that building. In the Building Regulations of several places it is expressly mentioned that there must be space for the unobstructed entrance and proper working of fire-engines.

The principal entrance doorway to a dwelling-house must be at least 6 ft. 10 in. high and 3 ft. 11 in. wide.

Doorways in fireproof walls must have easily-closed iron doors in stone or iron setting. But no opening for a doorway may be made in such a wall without sanction of Building Committee and consent of adjoining owner. Consent of the latter shall not bind a subsequent owner unless he becomes a party thereto.

J. Windows.—Windows must not open outwards so as to project beyond the wall into or over the street, unless the bottom of casements be at least 6 ft. 10 in. above the street.

Blank or sham windows are not allowed on a street or public place, unless furnished with frames, casements, and glass.

No window or opening is allowed in a wall facing a neighbouring plot unless it be distant at least from 7 ft. 9½ in. to 14 ft. 6 in. from the boundary, except by consent of the owner of that plot. His consent does not bind a subsequent owner unless the latter ratify it.

No window or opening is allowed in a party wall adjoining another and lower house so as to overlook the roof, except by special permission of the Building Committee, consent of adjoining owner, and provision of fireproof shutters to openings. The consent of adjoining owner shall not prevent him from subsequently raising his own building higher, even though this should obstruct or build-up such openings.

I shall have occasion to revert to this subject when I come to speak of the question of Light and Air.

K. Floors and Ceilings.—Floor-joists to be trimmed round chimneys so as to have no woodwork nearer than 6 in. to the outer face of the same, and the space to be filled with brickwork bonded into and projecting from chimney.

Joists to be not more than 2 ft. 11 in. apart centres, and to be of the following dimensions :—

If of square section :

Clear Span.	Side.	Clear Span.	Side.
10 ft.	6½ in.	18 ft.	9 in.
12 ft.	7¼ in.	20 ft.	9½ in.
14 ft.	7¾ in.	22 ft.	10¼ in.
16 ft.	8½ in.	24 ft.	10¾ in.

If of unequal sides :

Clear Span.	Depth.	Breadth.	Clear Span.	Depth.	Breadth.
14 ft.	8 in.	6 in.	20 ft.	12 in.	6 in.
16 ft.	9 in.	7 in.	22 ft.	13 in.	6½ in.
18 ft.	11 in.	6 in.	24 ft.	14 in.	7 in.

and, in general, the dimensions as well as the distance apart of the joists must be properly proportioned to the span and load, so as to insure due strength and stiffness under all circumstances.

Floors to be pugged with brick, mortar, or dry clay : sawdust not to be used where a fireproof floor is required.

In each floor, except ground floor, at least one joist is to be secured as a tie, from wall to wall, between each pair of windows.

No opening for a lift, &c., may be left or made in any floor without special permission of the Building Committee, unless it be rendered fireproof by being walled-in with brick and the openings into it provided with iron doors in stone or iron frames.

Garrets in houses of more than two stories must have a fireproof floor of brick or stone at least 3 in. thick laid in mortar ; and the woodwork of roof must be everywhere entirely clear of this floor.

Bakehouses, washhouses, and breweries must be floored with iron, brick, stone, asphalte or other similar suitable material. In entries and landings the floor must be of brick, stone or iron.

The ceiling of all rooms containing a fireplace must be plastered.

L. *Entries and Stairs.*—Entrance-halls and staircases of dwellings must be of the following widths :—

No. of Stories, including Ground Floor.	Width of Hall.	Width of Stairs.
1	3 ft. 5 in.	.....
2	4 ft. 10½ in.	3 ft. 10¾ in.
3	5 ft. 10 in.	4 ft. 4½ in.
4	5 ft. 10 in.	4 ft. 10½ in.

Lobbies and landings must be at least as wide as the stairs, and be of stone or iron. Stairs must have a handrail, and be well lighted.

In a house whose length does not exceed from 73 ft. to 97 ft. there must be at least one staircase, and for every such additional length or part of such length one additional staircase. These stairs must be fireproof, of stone carried on brick arches, or of iron protected by brick walls $11\frac{3}{4}$ in. thick, and they must be in direct communication with the rooms on each floor. Stairs to cellar and on garret floor must have iron door in stone or iron setting; the top of those to garret to be protected by a fireproof brick dome. In Gothenburg and some other places, certain modifications of the rule are allowed, wooden stairs with plastered soffit being permitted in houses of not more than two floors.

Angle of rise of stairs is mostly stated to be limited to 45° ; but this is controlled by an absolute specification of the dimensions of risers and treads, ranging from 7 in. risers with $10\frac{1}{2}$ in. treads to 8 in. risers with 10 in. treads.

M. Roofs, Gutters, &c.—Roofs having a fall to both sides must not exceed in height two-fifths of span. Roofs with only one fall must not exceed five-sevenths of span. Dwelling-houses must not have mansard roofs. But exceptions to these rules may be allowed by the Building Committee in special cases or to suit architectural requirements.

Roof must not project over boundary of plot: nor may it have a slope towards adjoining plot unless by consent of adjoining owner, or unless the building be clear of the boundary by a space in most cases fixed at 7 ft. 9 in.

Height from garret floor to eaves must be at least 1 ft. $11\frac{1}{2}$ in., and garret must be properly lighted by dormer windows, skylights, or glass tiles. No fascia or pediment may be of wood, and special provision is made for the protection of frames and dormers by sheathing with metal.

Roof to be covered only with tile, slate, metal, or other approved fireproof material. Pantiles are allowed only if their joints are pointed; and all tiles laid on laths must be pointed. Straw bedding to tiles is prohibited. If the roof be boarded under its covering, the boards must be rendered incombustible. But in Stockholm and in Christianstad boarding under tiling is expressly prohibited. The use of wooden shingles is permitted in Örebro, but they must be rendered incombustible.

A trapdoor, sheathed with metal, must be provided in every roof, and a ladder must always be in position under it.

Roofs to have metal eaves-gutters and down-pipes.

Roofs not in accordance with these rules must not be repaired, and must be entirely removed within twelve years from date of Building Regulations.

N. Concrete Buildings.—The Building Regulations as to concrete structures vary so much in different localities that it is not possible to abstract and arrange them in one code. Those of Stockholm may be summarized as follows:—

Concrete buildings must not exceed 20 ft. 6 in. in height above their brick or stone basement wall, which must not exceed 5 ft. 10 in. in height above ground. External

walls must be at least 1 ft. 5½ in. thick, and where there is an upper storey the walls of lower storey must be at least 1 ft. 11½ in. thick. The same precautions against fire must be observed as in the case of brick buildings. The Building Committee may in each individual case prescribe special conditions to be observed, as well with reference to stability and safety as to the mode of preparing and using the materials for the work.

In some towns they are limited to a height of from 22 ft. 5 in. to 35 ft., sometimes coupled with a condition that the number of floors (including ground floor and garret) shall not exceed three. In Helsingborg they may be built only as side buildings and outbuildings. In other places, again, they are subject to the same regulations as brick buildings.

o. Timber Buildings.—In Stockholm and Lund the erection of timber and of brick-nogged buildings is strictly limited to certain outlying suburbs, save as minor outbuildings whose locality is also defined.

In other towns their height is restricted to one and two storeys, elsewhere to from 25 ft. 4 in. to 35 ft.; and in general the conditions respecting them are as follows:—

They must be plastered or tiled externally and plastered internally as the Building Committee may direct. They must not be erected against the boundary of the plot unless a fireproof wall be built between them and it. No one such house may contain more than twelve several tenements. No fireplace or stove may be installed in any such house unless where there was one prior to the date of the Building Regulations, nor may any new stove-pipe be placed on the outside of a wooden wall. Any brick or stone building, raised-upon with or having its upper part constructed of timber, is classed as a wholly timber building. These regulations apply to towns where timber and brick-nogged buildings are freely permitted, as well as to those in which they are limited to certain defined localities in the suburbs.

p. Theatres.—Theatres must be situated at least 40 ft. within the boundary of their own ground on all sides; or else must be 10 ft. within the boundaries and have fireproof walls not less than 1 ft. 5½ in. thick with no other opening than at the ground level for exit.

q. Inspection, &c.—After notice has been received of an intended new building, or of additions to or raising-upon or equivalent alterations in an already existing building, and the drawings for the same have been deposited, the Building Committee shall appoint one of their number who, together with the town architect, shall examine the site of the intended building and ascertain and report to the Building Committee whether the proposed building is suitable to the site, whether the requirements of the Building Ordinance and the Building Regulations are observed, and whether in other respects any special conditions are necessary.

The Building Committee shall carefully follow the progress of the work, and make inspection thereof as follows:—

1. When the excavation is made, on which occasion they shall prescribe the observance in the laying of the foundations of such special particulars as may be found necessary by reason of the nature of the ground or by other circumstances.
2. When the foundations are set out, before the footings are laid.

3. When the foundation walls are built and the superstructure is about to be commenced.

4. When the naked flooring is laid (save that of ground floor), floor by floor successively.

5. When the roof, chimneys, and stairs are put up, before the rooms are plastered or the floors boarded.

6. Stonework and brickwork of timber buildings.

7. When any fireproof floor is laid.

8. When the building is completed and before it is occupied.

Notice must be given to the Building Committee when each of the foregoing stages of progress is reached, and inspection shall take place within two lawful days after receipt of notice. At each inspection the approved drawings shall be produced and compared with the work, and a certificate of its execution in strict conformity with them and with such conditions as may have been prescribed shall be entered upon the drawings. The fees payable on inspection, etc., are given in Appendix.

All work must be executed in a proper manner, and none but good and reliable materials may be used.

All scaffolding, enclosure, etc., required during the work, must be sanctioned by the Building Committee before it is put up, and all must be removed at the expiration of the time prescribed. It shall not occupy more than one-fourth the width of street, nor project more than 11 ft. 9 in. outside the building-line. If the street be so narrow that the scaffolding, etc., would interfere with traffic, it must be erected overhead.

Steam-engines must not be used on the work, without permission of the Building Committee under such conditions as they may prescribe.

R. *Alterations and Repairs.*—Minor repairs do not require notification to the Building Committee.

An owner desiring to make repairs, alterations, or renewals, of walls, stairs, roof, floors, fireplaces, or chimneys, such as are not by the Building Committee classed as new work, adding-to, or raising-upon, or such as have for their object the conversion of the building to other than its former use and purpose, must give notice of his intention to the Building Committee, who shall inspect and report as already specified under the article "Inspection."

In the case of brick or stone houses, alterations and repairs must as far as possible be executed in accordance with the regulations respecting new structures of the same class.

In the case of timber or brick-nogged houses, they may not be raised to more than their former height, and in other respects the work must as far as possible be in accordance with the regulations concerning new structures of the same class.

Within fourteen days after completion of any such alterations or repairs as require previous notice to be given, notice of such completion must be given to the Building Committee, who shall inspect the work, and ascertain if it has been executed in a proper manner and in accordance with prescribed regulations.

If a new building has been commenced, but not completed within five years, the

Building Committee shall, after due investigation, require the owner either to complete the same, or else to remove what is already erected and to clear and level the ground.

s. *Ruinous and Dangerous Structures*.—A building ascertained by the Building Committee to be so dilapidated as to occasion danger of fire or of accident by falling, shall be repaired in such manner as circumstances may require. If this repair be not executed within a prescribed time, or if it be found that the building cannot be repaired into a safe condition, the Building Committee shall require the owner to wholly or in part demolish it within a prescribed time not exceeding from six to nine months.

If the demolition of a building be suspended, so that what remains is either dangerous or unsightly, the Building Committee shall require the owner to complete the demolition within a specified time not exceeding six months.

If a building condemned by the Building Committee be not demolished within the prescribed time, the Building Committee may cause the demolition to be effected at the expense of the defaulting party.

Such is briefly the building law of Sweden. That among so many local codes there should be some comical and eccentric items is not wonderful: the wonder is that they are so few. In the nineteen codes from which this paper is compiled I detected only four, viz., the prohibition in the Building Ordinance of pure white for the colour of a house ("crushed strawberry," slaughter-house red, and other such like abominations, being left unmentioned, probably as too hideous to occur to any sane person); the Malmö and Christianstad requirement that blank windows shall be furnished with frames, casements and glass; the Halmstad clause requiring that buildings on a principal street, whatever their purpose, shall be so designed as to have the appearance of dwelling-houses; and the prohibition in Gothenburg and Karlskrona of door-knockers—a prohibition which some among us may wish had a wider local extension.

The general question of Light and Air is not expressly included in the Building Ordinance or the Building Regulations. A portion of it has been, however, touched upon above in the articles concerning windows, and I may as well complete the little which remains to add.

The law of easements is regulated by the enactment of June 1875, and is briefly as follows:—An agreement by which one property is charged for the benefit of another with an easement of prospect, windows, right of way, access to water, digging of clay or gravel, and so forth, must be in writing, and must be registered. Such registration, when once effected, requires no renewal, but the rights therein comprised may, by consent of the person enjoying them, be subsequently abridged or extinguished. An easement, registration whereof is applied-for prior to the registration of a conveyance of the servient property, stands good. If registration of the two be applied-for on the same day, the agreement for the easement can hold only if it be of earlier date than the agreement for sale. In case easement and user cannot co-exist, the one of them for which registration is first applied holds good. If application be made on the same day, the one which is of earliest date takes precedence.

It therefore appears, not only that an easement of light and air cannot be acquired by prescription, but that a man actually has no right even to have a window which overlooks his neighbour unless the wall stands at a regulated distance from the boundary between the properties; and that, even if his neighbour sanctions such a window, the sanction conveys no right except it be expressly conveyed in a written and registered contract.

Whether professional ingenuity has contrived to complicate the subject is more than I can say. But the enactment itself is extremely straightforward, simple, and accordant with common sense, and may possibly prove suggestive to those who would gladly find a way out of the intricacies and perplexities in which, here at home, the matter appears to be almost hopelessly involved.

ALEXR. BEAZELEY.

APPENDIX:—SCHEDULES OF FEES, &c.

NOTE.—Dimensions and values are reduced to proportional English equivalents.

GOTHENBURG.		<i>Town Engineer's Fees.</i>		s.	d.
<i>Town Architect's Fees.</i>					
1. Examining Drawings :	s. d.	1. Measuring ground, &c. (assistance and materials included) :			
(a) for a new building :		If area does not exceed 5000 sq. ft. (first class) .	11	9	
House of not more than two storeys :		If area exceeds 5000 sq. ft. but does not exceed 100,000 sq. ft. (second class) :			
Occupying less than 1000 sq. ft. .	3 0	For each full 100 sq. ft. up to the first 5000 sq. ft. .	0	4	
Occupying 1000 sq. ft. and upwards ;		For each additional full 100 sq. ft. .	0	2	
for the first 1000 sq. ft. .	6 0	If area exceeds 100,000 sq. ft. but does not exceed 200,000 sq. ft. (third class) :			
For each additional full 1000 sq. ft. .	2 6	For each full 100 sq. ft. up to the first 5000 sq. ft. .	0	4	
House of more than two storeys :		For each full 100 sq. ft. additional, up to 100,000 sq. ft. .	0	2	
Same fees as above, adding for each additional storey .	3 6	For each additional full 100 sq. ft. .	0	1	
(b) for alterations in the façade or other parts of a house :		If area exceeds 200,000 sq. ft. (fourth class) :			
House of not more than two storeys and occupying less than 1000 sq. ft. .	3 0	For each full 100 sq. ft. up to the first 5000 sq. ft. .	0	4	
All other houses .	6 0	For each full 100 sq. ft. additional, up to 100,000 sq. ft. .	0	2	
2. Inspections :		For each full 100 sq. ft. additional, up to 200,000 sq. ft. .	0	1	
(a) as required by Building Regulation [see under head "Inspection, &c."]:		For each additional full 100 sq. ft. .	0	1	
Each inspection, including memorandum thereof on drawings :		Certificate of measurement, irrespective of area .	5	6	
House occupying less than 2000 sq. ft. .	3 0	Plan, from actual measurement:			
" " 2000 sq. ft. and upwards ; for the first 1000 sq. ft. .	3 0	When fee for measuring is of 1st class .	11	0	
For each additional full 1000 sq. ft. .	1 3	" " " 2nd " .	16	6	
(b) as required by Building Regulations in other cases :		" " " 3rd " .	33	0	
On requisition of owner or builder ; for each inspection .	11 9	" " " 4th " .	44	0	
3. Report in writing as to inspection made, where such report is requested or prescribed :		Examination of old map and certifying as to its correctness .	3	4	
If the report does not include a valuation based on measurement and calculation, or if such valuation amounts to less than £100 .	10 0	2. Staking out for new work (assistance included) .	11	0	
If the valuation amounts to £100 and upwards ; for the first £50 .	10 0	3. Levelling (assistance included) :			
For each additional full £50 .	1 0	In connection with staking out for new work .	5	6	
		On other occasions .	11	0	

	s.	d.		s.	d.
Certificate of levelling, if requested	3	4	3. Measuring ground, &c. (assistance and materials included) :		
4. Attendance of engineer for work requiring assistance, in case such work cannot be performed owing to circumstances occasioned by the person at whose request he attended	7	9	If area does not exceed 6000 sq. ft. (first class)	11	9
JÖNKÖPING.			If area exceeds 6000 sq. ft. but does not exceed 100,000 sq. ft. (second class) :		
1. Measuring building-plot or other building site, whether staking-out be done or not :			For the first 6000 sq. ft.	11	9
If area does not exceed 12,000 sq. ft. (first class)	6	0	For each full 1000 sq. ft. additional, up to 100,000 sq. ft.	0	7
If the area exceeds 12,000 sq. ft. but does not exceed 36,000 sq. ft. (second class) :			If area exceeds 100,000 sq. ft. (third class) :		
For the first 12,000 sq. ft.	6	0	For the first 100,000 sq. ft.	55	0
For each additional full 1000 sq. ft.	0	4	For each 1000 sq. ft. in excess	0	3½
If area exceeds 36,000 sq. ft. (third class) :			Certificate of measurement, irrespective of area	5	6
For the first 12,000 sq. ft.	6	0	Plan, from actual measurement :		
For each additional full 1000 sq. ft.	0	4	When fee for measuring is of 1st class	11	0
If area exceeds 36,000 sq. ft. (third class) :			" " " 2nd "	16	6
For the first 12,000 sq. ft.	6	0	" " " 3rd "	33	0
For each additional full 1000 sq. ft. up to 36,000 sq. ft.	0	4	Measuring, when only for the purpose of settling disputes between neighbours, or for testing accuracy of a map not more than ten years old : same fees as the preceding, according to class, including certificate as to accuracy of map.		
For each additional full 1000 sq. ft.	0	3	Staking-out, either for a new building or for settlement of disputes between neighbours	11	0
Certificate of measurement, if requested, irrespective of area	1	8	Levelling (including assistance) :		
Plan, from actual measurement, accompanied by description :			In connection with staking-out or other similar business	5	6
When fee for measuring is of 1st class	5	6	On other occasions	11	0
" " " 2nd "	7	8	Certificate of levelling, if requested	3	4
" " " 3rd "	11	0	Section or local plan, from actual levelling:		
Plan of plot or building site, copied from general town plan, accompanied by description	4	6	Of 1st class plots	11	0
Staking-out, not connected with measurement of area :			Of 2nd " "	16	6
For each plot or building so staked out	3	4	Of 3rd " "	33	0
Levelling, for determination of level of plot or site, or of height of basement wall of building, or for both purposes if done at one time	5	6	Attendance of engineer to perform work, in case such work cannot be performed owing to circumstances occasioned by the person at whose request he attended	5	6
Certificate of levelling, if requested	1	8	If assistance has been provided as above, a further fee of	2	3
2. Inspections as required by Building Regulations : each	1	8	LUND.		
KARLSKRONA.			<i>Town Architect's Fees.</i>		
1. Examining Drawings :			1. Examining Drawings :		
If value of building is below £850 :			(a) for a new building :		
House of one storey	2	4	House of not more than two storeys :		
Each additional storey	1	2	Occupying less than 1000 sq. ft.	1	9
If value of building exceeds £850 but does not exceed £1700 :			Occupying 1000 sq. ft. and upwards ; for the first 1000 sq. ft.	2	4
House of one storey	4	8	For each additional 1000 sq. ft.	0	2
Each additional storey	2	4	House of more than two storeys :		
If value of building exceeds £1700 but does not exceed £2800 :			Same fees as above, adding for each additional storey	2	4
House of one storey	7	0	Shed, small outhouses, &c.	1	2
Each additional storey	3	6	(b) for alterations and additions to a building :		
If value of building exceeds £2800 :			House of not more than two storeys and occupying less than 1000 sq. ft.	1	9
House of one storey	9	4	All other houses	3	6
Each additional storey	4	8	(c) for repairs :		
Certificate of examination of drawings	3	4	The Building Committee will determine		
2. Inspections (including attest) :					
New building, i.e. a new house or a new storey	5	6			
Work not included in above description	3	4			

	s.	d.
to what class the proposed repairs belong, and will endorse the same upon the drawings; the fees being:—		
Repairs of 1st class	4	6
" " 2nd "	2	9
" " 3rd "	2	0
" " 4th "	1	2
2. Inspections:		
(a) as required by Building Regulations:		
Each inspection, including memorandum thereof on drawings:		
House occupying less than 2000 sq. ft. .	1	2
For every completed 1000 sq. ft. beyond	0	7
(b) in other cases:		
Upon request of owner or builder, each inspection, including certificate . . .	3	4
Other official certificates	1	8

Town Engineer's Fees.

1. Measuring ground, &c. (assistance included):		
(a) Building-plots in the town and its district, not classed as arable and pasture:		
As regards the condition of the plot:		
For each corner occupied by buildings to be marked on plan	1	2
For each corner occupied by buildings not to be marked on plan	0	10
For each unoccupied corner, and for each corner where the buildings are distant 10 ft. and upwards from the angle	0	4
As regards the area of the plot:		
For a plot containing 5000 sq. ft. or less, for each 100 sq. ft.	0	2
For each 100 sq. ft. above 5000	0	1
(b) Ground in the town district not classed as building-plots:		
Area not exceeding 500,000 sq. ft., for each 100 sq. ft. up to 5000	0	$\frac{1}{8}$
For each 100 sq. ft. above 5000	0	$\frac{1}{16}$
(Minimum fee to be 5s. 7d.)		
Making out plan:		
Ground coming under class <i>a</i> , one-half of fees for measuring same.		
Ground coming under class <i>b</i> , one-fourth of fees for measuring same.		
In each case adding the sum of	3	4
(The person at whose expense the survey and plan are made is entitled to a copy of the plan, free of charge.)		
Preparing scheme for sub-division of a plot:		
When it is to be divided into two parts .	11	0
Each additional part	2	3
Staking-out for a new building	3	4
Levelling, as required by Building Regulations	5	6
2. Certificates, &c.:		
Of measurement, &c., for the first sheet .	2	3
For each subsequent sheet	1	2
Special official certificates	1	8
Certificate endorsed on another document .	1	2
3. Attendance of engineer to perform work, in case such work cannot be		

	s.	d.
performed owing to circumstances occasioned by the person at whose request he attended	2	3
If assistance has been provided, for each assistant	0	7

*NORRKÖPING.**Town Architect's Fees.*

1. Examining drawings:		
(a) for a new building:		
House of not more than two storeys:		
Occupying less than 1000 sq. ft. . . .	2	11
Occupying 1000 sq. ft. and upwards; for the first 1000 sq. ft.	5	10
For each additional full 1000 ft. . . .	2	4
House of more than two storeys:		
Same fees as above, adding for each additional storey	3	6
(b) for alterations to a building:		
House of not more than two storeys and occupying less than 1000 sq. ft. . . .	2	11
All other houses	5	10
2. Attendance at inspection	2	3

Town Engineer's Fees.

1. Measuring ground, &c. (assistance and materials included):		
If area does not exceed 5000 sq. ft. (first class)	11	9
If area exceeds 5000 sq. ft. but does not exceed 100,000 sq. ft. (second class):		
For each completed 100 sq. ft. of the first 5000 sq. ft.	0	3
For each completed 100 sq. ft. additional, up to 100,000 sq. ft.	0	$1\frac{1}{2}$
If area exceeds 100,000 sq. ft. (third class):		
For the first 100,000 sq. ft. same fee as for second class;		
For each completed 100 sq. ft. additional. .	0	$\frac{3}{4}$
Certificate of measurement, irrespective of area	5	7
Plan from actual measurement, with description:		
When fee for measuring is of 1st class . .	11	0
" " " 2nd "	16	6
" " " 3rd "	33	0
Copy of a former map, with description, half of the above fees.		
Examination of old map and certifying as to its correctness	3	4
2. Staking-out for new work (assistance included)	11	0
3. Levelling (assistance included):		
In connection with staking-out for new work	5	6
On other occasions	11	0
Certificate of levelling, if requested . .	3	4
4. Attendance of engineer for work requiring assistance, in case such work cannot be performed owing to circumstances occasioned by the person at whose request he attended	7	9
Attendance at inspection	2	3

ALEXR. BEAZELEY.

XVIII.

SOME AMERICAN METHODS. By JOHN B. GASS, *Associate*.

[Read on Monday, 15th March 1886, Ewan Christian, *President*, in the chair.]

AS Holder of the Godwin Bursary for 1885, I visited many important cities in the United States and Canada, and collected all the information within my power on the subjects mentioned in the Regulations for the Administration of the Funds of the Bursary, and on other matters of professional interest. My visit, which extended to upwards of three months, was of great practical value to myself, and I must express my deep sense of obligation to Mr. Godwin for his institution of the Bursary. I am also much indebted to many American architects and others for their ready assistance in my investigations and for their unfailing courtesy and hospitality. Many of their names appear in the Report, and I shall always treasure the remembrance of their kindness, and of my visit to their country.²⁰

My Report, which I have had the honour of submitting to the Council, I endeavoured to make as concise and clear as possible, and from it, at the invitation of the Council, I have selected portions which I think may be of the greatest general interest to bring before the Institute.

INCOMBUSTIBLE OR FIREPROOF CONSTRUCTION [Illustrn. xxix.]

Iron Construction with Hollow Tile (terra-cotta) Arches, and all Ironwork protected by terra-cotta.—The ordinary hollow tile is composed of fire-clay as a base, mixed with a small percentage of potter's clay; it is moulded in dies in various hollow forms, by means of powerful machinery, and after suitable drying is burned in a kiln in a manner similar to terra-cotta. Where it is to be plastered it is either scratched or properly keyed. Porous terra-cotta is composed of a mixture of fine clay and some combustible material, as sawdust, charcoal, cut-straw, tan bark, &c. When baked the combustible material is consumed, leaving the terra-cotta full of small holes. It is fireproof, of little weight, great tenacity, strong, can be cut with edge tools, will hold nails driven in, and gives good surface for plastering.

²⁰ See for the names of many of the architects to whom I refer, and for a list of the drawings, &c., I brought away with me, the Journal of PROCEEDINGS, Vol. II., New Series, pp. 161-162.—J. B. G.

Tile arches are made of hollow blocks, wedge shaped generally, with flat soffit and sides, about $\frac{5}{8}$ in. thick. The butment pieces, being next the beam, are shaped to fit on the lower flange and set squarely, with the lower edge formed to support a flat beam soffit tile, which protects the bottom flange of the girder. Each voussoir is made to fit in its place, with joints about $\frac{1}{2}$ in. thick. The mortar is composed of lime and coarse screened sand, in proportions of 4 to 1, and is richly tempered with hydraulic cement. Tiles are laid to break joint and fixed on portable centres, which are not struck for at least 36 hours. A 6-in. arch (safe span up to 5 ft.) weighs 22 lbs. per square foot. A 10-in. arch (safe span up to 7 ft.), with web tiles, weighs 40 lbs. per square foot. If properly laid, and the tiles free from cracks and defects affecting their strength, the arch should be capable of sustaining an equally distributed load of 500 lbs. per superficial foot without deflection.²¹

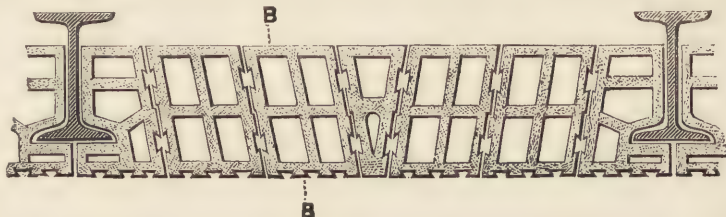
Ceilings are plastered on underside, or if the tiles be exposed, the joints are flushed up while the tiles are being laid and dressed off. If the floor be boarded, sleeper joists, wedge-shaped, are laid at the required level, flushed up to the top with strong concrete, and flooring boards are then nailed on. If a tile floor, the tiles are laid upon concrete bed. In some cases the concrete is finished with fine surface.

Where beams (generally wrought iron) come beneath the floor they are cased with porous terra-cotta blocks, shaped to rest on and protect lower flange: if double girders are used they are formed so as to hold soffit block. Or fire-clay tiles with grooved edges, secured in place with band-iron strips encircling the girders; between these strips the tiles are laid with gauged mortar. Air space of at least 1 in. is secured between the girder and tiles. Beam casings are plastered along with ceilings.

Iron columns, if cast with flanges, are cased with porous terra-cotta or hollow tiles which fit in between the flanges, and are either secured with a plate screwed into the flange or dowelled or clamped together; the joints are made with gauged mortar. Ordinary cylindrical columns are encased with solid tiles moulded to suit the section of the column, with air space of 1 in. left next the column. Each course consists of two pieces, laid to break joint, and put together with small cast iron clamps set in the end of the

²¹ This method is not unknown in England. The *Doulton-Peto* fireproof flooring [see diagram] has stood the test of upwards of 6 cwt. to the foot dead weight on material only, and with arch of 6 ft. span and quite flat; on an arch of 8 ft. span a cask of graphite weighing 7 cwt. has been rolled and rocked, the vibration doing no injury.

After five hours exposure to a severe heat, formed by lighting a fire of wood, very fierce, a strong jet of water was thrown at once upwards against the red hot flooring, the upper side of same



remaining comparatively cold, in consequence of the occasional air passages arranged within. The new London Pavilion in Piccadilly is constructed throughout with this flooring. A large building of four storeys at Messrs. Doultons' own factory is similarly constructed, and may be seen at any time, the underside not having been plastered.

tile; or a hollow tile is made in quarters with flanges which are clamped together, or a hoop-iron ring is inserted in grooves at ends of blocks. The columns are finished outside with cement or plaster.

Partitions or internal walls are made of hollow tiles with the hollow following horizontally or vertically, with plain sides or horizontal dovetailed grooves for plastering. Where the hollow follows horizontally, the blocks are set with gauged mortar; where vertically, terra-cotta clamps are set to each tile. At all openings wood frames are built in. Hollow tiles make very strong walls, of value for bearing and party walls, being partially sound proof; they are also used for outer walls of buildings. A 5 in. hollow tile resists heat better than a 12 in. brick wall. A 6-in. partition weighs 22 lbs. per superficial foot when set; 4 in., 18 lbs.; $3\frac{1}{2}$ in., 16 lbs.; and $3\frac{1}{4}$ in., 14 lbs.

Hollow tiles are used for furring external walls to prevent damp and give free circulation of air. They are also used for fireproofing inside of timber-frame houses. I am informed that some tall buildings are in contemplation in Chicago with iron framing and hollow tile outside filling.

Fireproof roofs are constructed with wrought iron beams, 8 ft. to 10 ft. centres, supporting $2\frac{1}{2}$ in. or 3 in. wrought iron \perp 's at 16 centres. The beams are encased as before described; the roof is formed of porous terra-cotta blocks between \perp 's, and plastered on underside. The exterior will receive nails, and may be covered with any kind of roofing. They are used for both flat and mansard roofs, are non-conducting, and give equable temperature. Roof trusses are also encased in terra-cotta.

A mansard roof may be formed of hollow partition tiles, set between wrought iron beams; slate is secured to wood slips and cement mortar plastered on the outer face; the weight is 25 lbs. per square foot. For a flat roof, flat hollow tiles are used between wrought iron \perp -joists, covered with water-tight covering, the weight being 16 lbs. per square foot; and arched roof tiles are used between \perp -joists, 18 lbs. per square foot. The New York City Building Law requires that all roofs must be covered with fireproof material.

Protecting woodwork with tiles.—The protection of underside wooden joists by terra-cotta blocks, now extensively used, has stood very good tests. Wooden joists are placed 9 in. apart to allow deafening with common bricks, which are laid on 2-in. by 1-in. strips nailed to the sides of the joists, the floors being concrete, tile, or boards. Ceilings of porous terra-cotta or hollow tiles, each tile having countersunk recess for $2\frac{1}{2}$ in. sq. iron plate, each plate supporting adjoining tiles and having a screw passing through it securing the tiles to the joists. The tiles are fixed dry, with joints $\frac{1}{2}$ -in. or $\frac{3}{4}$ -in. wide. The first coat of plastering laid on the tiles fills the hollow over the iron plates and the open joints between the tiles: the combination of plastering and tiles forms the fireproof ceiling. The addition to the usual weight of the floors is 12 lbs. per sq. foot; to ceilings alone without a floor above, 8 lbs. per foot. In another method, tiles 12 in. by 12 in. by $\frac{1}{2}$ in. are formed with grooved edges, or ends, and supported in place by $1\frac{1}{4}$ in. No. 14 band iron, which is in turn secured to the joists with screws and galvanized iron separators; this prevents the tile coming within $\frac{1}{2}$ in. of wood. If wrought iron girders are used they are protected as before described.

Brick and corrugated iron arching, &c.—The ordinary brick arching in 4 feet spans, on cross wrought iron girders, with haunches levelled up with concrete and girders exposed on underside, is still much used, notwithstanding many disastrous failures. Porous terra-cotta skewbacks are made to cover the lower flange of girders, with segment arches built in the usual way, either with common bricks or porous fire bricks. Corrugated iron soffit, with arch formed over of rough cement concrete, is often used. In Canada there is occasional use of wrought iron joists of about 21 in. centres, 4 in., 6 in. and 8 in. deep. 1-in. boards rest on the bottom flanges, and the concrete above, 6 in. and 8 in. thick, is finished with cement face or boarded on top, the soffit being plastered.

Slow burning construction.—Slow burning or "mill construction" is in very general use in all sorts of mercantile buildings, and affords excellent protection against fire spreading. It is best illustrated in the construction of cotton mills, which have brick walls, diminishing in thickness to $1\frac{1}{2}$ bricks in top storey with set off at floor level and windows recessed outside. Bays 8 to 10 ft. centres; columns of wood square and not tapered, with a hole bored through the centre about $1\frac{1}{2}$ in. diameter, with two $\frac{1}{2}$ -in. holes transversely at top and bottom for ventilation, with cast iron pintle between. In some cases the pillars are a combination of iron and wood, and occasionally cast iron alone. In one five storey mill with wood columns the beams were run through and the upper storey columns rested on them, instead of on an iron pintle: the result, with shrinkage, &c., was a sinking of 5 in. on the top floor. Wooden beams, either solid or in two pieces bolted together, have a plank floor (grooved and with hard wood lath), 3 in. thick for 8 ft. bays, $3\frac{1}{2}$ in. thick for 10 ft. bays, 4 in. thick for 12 ft. bays; flooring of $1\frac{1}{4}$ in. hard wood boards, tongued and grooved, is laid over two thicknesses of rosin-sized sheathing-paper, or $\frac{3}{4}$ in. mortar. Ceilings have planks dressed underside or dressed boards fixed after the floor has stood for some time. No painting, varnishing, or filling is done for at least three years after the building is finished. If there be no basement, a space is excavated under the floor, and the ground floor joists rest on sleeper walls. Where special dangers exist of fire, as in the picker room, hot drying rooms, &c., ceilings are plastered on wire cloth; or wood columns, the ceilings, and all woodwork, are lined with bright tin. In only one case was brick arching met with in a picker room ceiling.

Roofs have wooden beams and planks $2\frac{1}{2}$ to 3 in. thick, grooved and with lath, laid nearly flat, the slope being about $\frac{1}{2}$ in. in one foot. Eaves project on brackets 18 to 36 in., and have plank at the end but no gutters or boxed cornices. The ground outside is sloped from the mill wall, and often has an under-drain. In Canada, where there is great difficulty from icicles forming at the eaves, the rain-water is often taken by internal pipes running through the centre of mill.

Roof coverings.—Tin plates painted on the underside before fixing, with two coats of red lead and preferably laid with vertical lap joint on rosin-sized sheathing, or on two or three layers of tarred paper. The tin plates are locked together, laid with white lead, secured with zinc, and painted on the outside. "Asphalte roofing" consists of three layers of asphalted roofing felt, covered with melted asphalte, and then a layer of small pebbles or coarse gravel. "Coal tar composition" is laid in various ways, one standard

brand having a layer of Manilla paper, three thicknesses of roofing felt, a coat of roofing composition, two thicknesses of felt and another coat of composition, with small pebbles or gravel, imbedded in and completely covering it. "Cotton duck," 16 ozs. per square yard, is laid on three folds of asphalte paper and nailed with strong tinned or copper carpet nails; it is thoroughly wetted after being laid, and then painted with white lead and boiled linseed oil, and fireproof paint to finish. This has only been in use about four years, but has stood very well. Slates are very rarely used.

Fireproof doors and shutters.—To prevent the spread of fire through internal door openings and in many places for outer doors, double doors are fixed, one for ordinary use, the other kept open and to be closed only in case of necessity. The best automatic fire-door fastening is the "Grinnell." The door slides on pulleys on inclined track, and is kept open by a rod fastened to the door and frame. The rod is made in two parts, united at the centre with a brass sleeve, made in halves, and secured together with fusible solder. The ends of the rod which come together in the centre of the sleeve are cut at an angle of 45° ; when the temperature rises in case of fire the fusible solder melts, the sleeve is forced open by the ends of the rods, and the door shuts. A fusible link is also adapted for the purpose. Fireproof doors and shutters are made of strong iron, or of wood tinned: the latter are made in two thicknesses of tongued and grooved $\frac{7}{8}$ in. boards laid diagonally across each other and nailed and clinched together. The door is then covered on the sides and edges with sheets of bright tin locked together like a tin roof. The hinges and hangings are bolted on. Adaptations of porous and ordinary terra-cotta, on iron frames, are occasionally used for fireproof doors.

Protection of woodwork.—Both in slow burning and ordinary construction, wire-cloth lathing is used. Wire of Nos. 17 to 20 guage, in $\frac{3}{8}$ in. squares, and kept $\frac{3}{4}$ in. from the woodwork by pieces of hoop iron is placed on edge and held in place by staples driven over the netting and hoop iron, and into the wood; the netting is plastered with mortar rather drier than would be used for wood laths. This is also supplied to protect ironwork, and it has had many tests of actual and severe fires, with excellent results.

Merritt plaster is a new plaster, the fire-resisting quality of which is highly spoken of. Its principle constituent, I believe, is asbestine, which is a silicate of magnesium, mixed with powdered flint, caustic potash, and silicate of soda: before use sand is added to it. It will adhere to smooth surfaces, and is likely to form a good fire-resisting material for covering iron, &c., being unaffected by heat and does not crack if water is thrown upon it when in a heated state. Magnesio Calcite is a saturated paper pulp $\frac{1}{4}$ in. thick, nailed over woodwork; it is perfectly fireproof, but will not stand water. Bright tin is much used in the cotton districts, particularly for making woodwork fire-resisting.

Fire Stops.—Almost all external brick walls to houses are furred inside. To prevent the spread of fire behind the furrings, fire stops are used. The "Boston Building Act" provides that each room at the top and bottom of storey shall have a "fire belt or stop" of fireproof materials, at least 6 in. wide, set up between the furrings; that the whole area of every floor from wall to wall shall be deafened with plaster at least 1 in. thick, or two thicknesses of asbestos paper or some other incombustible material laid on the rough

flooring. Where there are stud partitions the floor joists immediately under, and between studs for 6 in. high, are to be filled solid and flush with the face of the plastering on both sides, with mortar, cement or other incombustible material; if partitions rest on solid joists, to be filled for 6 in. high above studs as above, or with a strip of tin or galvanized iron under studding and 1 in. wider. In staircases, between stringers to be closed at intervals of 3 ft. by stops of incombustible material.

In New York city, fire escapes are required on all tenement, flat and apartment houses, office buildings, lodging houses and factories; the same are required and provided in other great cities. In many cases, stand-pipes, with nozzle for each floor, run up alongside the fire escape.

Fireproof buildings and materials.—The most severe tests of the fire-resisting value of materials and construction were in the great fires at Chicago and Boston. The following observations were made by Mr. P. B. Wight, Fellow of the American Institute of Architects, now of Chicago:—Brick stood the best for walls; two sorts, red and buff, the latter resisting the best. Many of both sorts burnt to white, blue or sulphurous yellow colour, several reduced to softness, others vitrified. White limestone entirely calcined; fronts in many cases were burnt off, leaving the brick backing standing one or two storeys in height. Sandstone stood better than limestone. At Boston, the granite, of which there was a great quantity, was disintegrated and reduced to fine sand, and the blocks not exposed to severe fire, "scaled." At Chicago, there were few granite faced buildings, but there were a few blocks lying in the streets, simply exposed to the heat; these all cracked throughout and "scaled." Both stone and granite exploded. A church built of petroleum stone, which is saturated with petroleum, was wholly burned out inside; the intense heat threw to the outside all the oil, which formed a hard coating about $\frac{1}{4}$ in. thick. The interior sides of the walls were not greatly injured, while the outside flaked a little, but this stone stood better than any other natural stone. Artificial stones suffered less damage than natural stones, and mortar stood better than bricks. Cast iron columns failed very badly, the ends melted off, and the columns cracked or bent. Ground storey columns, and those carrying wall girders, collapsed and brought down whole buildings. Wrought iron beams sagged through the heating of the bottom flange, and were pulled out of the walls, giving way readily. Floors with brick arching did not stand so well as corrugated iron arches with concrete filling, but the failure was generally from columns and girders. Heavy iron shutters with sheet iron backing stood pretty well. Many appeared perfectly sound and were not warped or twisted out of place, though exposed to great heat. Thick walls stopped the progress of fire. Many buildings were set on fire on the top, outside; in other cases, the roof was thrown off by heated air in building. Telegraph poles got charred, but stood, while the surrounding buildings were completely destroyed.

In conversations with several chiefs of important fire brigades, whose splendid organizations are so well known, I made the following notes:—

1. Terra-cotta block system, with all iron encased, has not had the test of a great fire; but in some places where it has been used, there have been fires in which great

heat has been generated without damage. It is thought to be the nearest approach yet made to perfectly fireproof building.

2. Brick arches with exposed ironwork are almost universally condemned, and are very dangerous to firemen; the less exposed iron there is about a building, the greater the fire-resisting qualities.

3. For warehouse building, "slow burning construction" is especially advocated where there is a good fire brigade, but floors should be made water-tight, with a scupper round them having outlets; this prevents damage by water to the room underneath. About twice as much damage is done by water as by fire. Solid floors, in all cases, are better than those having spaces in.

4. The difficulty in case of fire being with the smoke, which prevents the seat of fire being reached, elevators, well-holes, and similar places, and the lights at the top of theatres, particularly behind the scenes, should be glazed with thin glass and covered with wire gauze. Every building of large size should have some place on the roofs that would serve as a smoke outlet.

5. Double iron doors, with a space between them, are the best fireproof doors for mercantile buildings.

6. One wood door, covered with tin, is better for fire protection than one iron door, but two iron doors, with air space between, are better than two tinned doors.

FIRE PROTECTION OF MILL BUILDINGS.

The usual construction of mill buildings does not lay any claim to being fireproof, but there are different systems used for protection from any fire that may occur. These generally consist of:—

1. Private fire organizations with steam fire pumps and other necessary apparatus.

2. Hydrants placed so as to be easily accessible, protected from frost as far as possible, and at sufficient distance from buildings (if practicable), as not to be injured by falling walls.

3. Stand pipes—vertical pipes extending to the height of water tower, with hydrants at each storey, and on to roof.

4. Hose kept at convenient points.

5. Fire pails. Pails of water at easily accessible places, carefully inspected, and kept full, with a reserve supply of water in casks kept in porches or corners of rooms.

6. Chemical fire extinguishing apparatus.

7. Watchmen and watch-clocks. When the machinery is stopped, watchmen make the round of each floor, every 40 or 60 minutes, and at certain stations have to touch a connection with a "watch-clock," which registers the time of each visit.

8. Sprinklers are formed by parallel lines of pipes extending across the rooms near the ceiling, and connected with a constant and sufficient water supply, furnished by pumps, reservoir, or tanks, so that the room, or that part of it in which the fire is, may be showered. They are of two kinds, valve and automatic sprinklers. In valve sprinklers the rows of pipes are perforated, the holes in the iron pipes being

brass-bushed or brass pipes altogether. Valves (with $\frac{1}{2}$ in. drip valves for testing) from the outside and inside, clearly labelled, to set the sprinklers in action. This system has many objections, as it is dependent on the right valve being opened at the critical moment, and the water, in case of fire, is not concentrated over the fire, but spread over the whole or the part of the room covered by that system of sprinklers. Valve sprinklers are in use in the older mills.

Automatic Sprinklers.—The first patent for an automatic sprinkler was, I believe, issued to Sir William Congreve in 1812, but it is only within the last eight years that sprinklers have been in general use in America, and only very recently used in some of the manufacturing districts of England. Automatic sprinklers are various forms of apparatus set in action by the fire itself at first breaking out, and are brought to bear directly on the place where the fire exists, and so arranged that when any one is in action the flow of the water sets an alarm bell in motion; this can be connected to offices, fire stations, &c. They are attached to the water pipes at frequent intervals, and so placed that each head covers an area of about 100 square feet. They depend for their action on a solder fusible at a low temperature, ordinarily at from 150° to 170° Fahr. This solder is composed of bismuth, lead, cadmium and tin; it does not change its melting point with age, will bear a considerable strain per square inch when applied as a single weight, but the constant application of a small weight causes the solder to stretch, it not having a great cohesive strength.

The Grinnell sprinkler, since its introduction in 1882, has been largely adopted. I am told that it has never failed to extinguish a fire, and in each case, with but trifling loss, no claim having been made on the Insurance Companies in the majority of the cases. In a test I witnessed, a wooden shed with water pipes 11 feet from ground, having a water supply of about 80 lbs. pressure, and sprinklers 10 ft. centres each way, contained a heap of shavings and chips loosely piled, about 5 ft. by 5 ft. by 2 ft., in centre of space. This was lighted in two places; within 23 seconds from the matches being applied, the fire burnt up and was completely extinguished, leaving the place full of smoke. The alarm bell was immediately set in motion. Very small damage was done to the heap by the fire, though it was thoroughly drenched with water.

In mills [Illustn. xxx.] the water pipes are placed close against the ceiling in centre of each bay, the sprinkler head hanging below the pipes. The opening for the escape of the water is at the centre of a flexible metal diaphragm; this opening is surrounded by a ring forming a valve seat. The valve consists of a disc of soft non-corrosive alloy, fixed upon a circular metal plate with a crowned notched edge, which also serves as a deflector for distributing the water, is held in place by a pair of compound levers soldered at the lower ends with fusible solder. When the solder is melted the lever falls, releasing the valve, and the stream of water impinges upon the plate. By a peculiar form of the edges it is thrown upwards and horizontally in a fine evenly distributed spray, wetting ceiling and floor. The special advantages of this form are that the solder is relieved from excessive strain and rapidly acted on by heat; and as long as the resistance of the levers keeps the valve in place the water pressure tends to

keep it tight, and no chance of leakage. When the melting of the solder takes away the resistance, the water pressure opens the valve.

The Parmelee sprinkler consists of a reaction turbine covered with a cap, and soldered near its lower ends. The distributing water pipe and branches are so arranged that the sprinkler head is about 12 inches below ceiling, and the water is thrown in an upward direction.

The Walworth sprinkler has an oval link of solder to secure a lever which holds the valve against the seat.

The Victor sprinkler differs in principle from the other automatic sprinklers, discharging the water from a series of perforations in ranges of pipes, as in the valve sprinklers, but the controlling valves are automatic in action, and placed so as to cover about 100 square feet, as in others. The sensitive solder is a funnel-shaped piece at the bottom of the valve.

Numerous other forms of sprinklers are in use, but after inspection I think that those I have described are the best of American make, though in the three latter ones the strain from the water pressure being directly on the fusible solder is a source of weakness.

Mr. Woodbury, Inspector, Factory Mutual Insurance Companies, gives the following table for the diameter of feed pipes, giving a discharge of 1 cubic foot per minute by each sprinkler from first tank supply, and allowing a uniform loss of head throughout the supply:—

Diam. of Pipe.							No. of Sprinklers.
$\frac{3}{4}$ inch.	...	...	...	...	...	...	1
1	"	...	...	...	...	...	3
$1\frac{1}{4}$	"	...	...	...	...	...	6
$1\frac{1}{2}$	"	...	...	...	...	...	10
2	"	...	...	...	...	...	18
$2\frac{1}{2}$	"	...	...	...	...	...	28
3	"	...	...	...	...	...	46
$3\frac{1}{2}$	"	...	...	...	...	...	78
4	"	...	...	...	...	...	115

From measurements taken, Mr. Woodbury finds that the discharge of sprinklers is represented by the formula—

$$Q = 5.075, a f \sqrt{p}.$$

Q = cubic feet per minute.

a = area of orifice in square inches.

f = co-efficient of efflux.

p = water pressure in pounds per square inch.

Constants as follows:—

	Area of orifice in square inches.	Co-efficient of efflux.	Co-efficient of discharge, $5.075 a f$.
Grinnell	... 1963	· 5576	· 5555
Parmelee	... 1760	· 5356	· 4784
Walworth	... 1963	· 7692	· 7663

The valve connecting the sprinkler system with the main water supply should be

held open by a rivetted leather strap, which can be cut when it is necessary to shut off water after a fire is extinguished.

Damage by fires from 1877 to January 1, 1885—particulars from the Mutual and other Insurance Companies. Buildings protected by sprinklers:—195 fires, damage 63,803 dollars; average loss per fire 327 dollars. Buildings not protected by sprinklers:—553 fires, 227 claims, damage 4,310,108 dollars; average loss per claim 19,987 dollars; average loss per fire 7,794 dollars. In buildings protected by sprinklers 30 per cent. of the fires, and in those not protected by sprinklers 39 per cent., result in appreciable loss and are followed by claims.

Difficulties with Sprinklers.—All sprinkler heads are tested under pressure before leaving the works, so that there is little danger of immediate leakage, which rarely happens. There is a possibility of the heads being opened by an accidental blow when cleaning, or by too close proximity to a gas jet or steam pipe; or opportunity might be taken to do wilful damage. I only heard of one case in which any difficulty had arisen in that way, and the damage was very slight. Where there is much frost, and the buildings are not kept uniformly heated, there is a danger that the water in the pipes may freeze; it is then necessary to shut the main valve and draw the water from the pipes during the very cold weather; this limits the operations of the sprinklers. A great number of appliances have been devised for the purpose of admitting water into a dry sprinkler system, but they are generally too complicated to be efficient. The Walworth Manufacturing Company's arrangement seems the simplest and most effective. The sprinkler system contains air at a pressure of about one pound to the square inch. The opening of a sprinkler head reduces the pressure, which acting upon the gate of a valve, allows the water to flow into the system.

The Providence Steam and Gas-pipe Company has a low-pressure air system, the water being kept back by the smaller disc of a differential piston valve which is kept closed by the pressure of air, resting against the larger disc of the valve. Liquids at a low freezing point are not used for filling the pipes as they are generally either corrosive to brass and iron, or combustible.

VENTILATION AND HEATING.

Massachusetts Institute of Technology, Boston.—This is a detached building 150 ft. by 90 ft. and 75 ft. (five storeys) high. It has large hallways and about 40 rooms; brick walls, not plastered, inside; large window spaces; floors, mill construction; beams strongly trussed; and a flat tar-and-gravel roof. The ventilation and heating is a combined system. Fresh air is brought in through enlarged window openings, covered with fine wire netting and fitted with sashes, so that the size can be reduced if required. The surface outside is grass on sandy soil, and remote from the street. The total area of openings is 100 square feet, while the mean velocity varies from 600 to 800 feet per minute. The air moves through a main coil 22 ft. long and 12 ft. high in 11 sections, 5 pipes deep, 1 in. spaces, pipes placed in direct line; aggregate area, 120 square feet; total heating surface about 2200 square feet. The air is raised to a temperature of 60° when

required. Steam is passed through nine of the eleven sections, and condensed water through the remaining two. The steam pressure is regulated by Tudor's fractional valve, and within the limits of 12 and 70 lbs. Some of the sections can be shut off, so as to give less heating area. The warmed air then enters a fan, placed in a large room, 12 ft. diameter, 4 ft. deep, mouth 9 ft., 12 floats curved. It is driven by an engine which also does other work; the normal rate is 90 revolutions per minute; the indicated horsepower is 8 in cold and 15 to 16 in warm weather. The air heated or not, as required, is driven by fan into sub-basement or plenum under the whole of the building, at a temperature of about 60°, where it is under pressure of $\frac{1}{8}$ in. water column, this being sufficient to give the required velocity through the flues, and give a slight outward pressure through the building. The plenum, 3 ft. high, has a tight plank flooring over; the floor is made of 4 in. concrete, faced with fine stuff, laid in sections with slopes to centre basins. Particles of dust in the air settle on the floor, which is periodically washed with hose, the water being pumped from the basins by steam ejector. The total area is 12,000 square feet, and lies within 2 ft. of water-line; it yields sufficient moisture to raise the actual humidity, and in warm weather cools the air, reducing it 5° to 8° below external air. The air could be further cooled by filling the steam pipes with ice-water, but this is not necessary, as the Institute is not used in the hot weather.

Air is distributed to the rooms through flues, 36 in. by 12 in., made in the walls, pointed and whitewashed inside. At the bottom of each flue is a coil box (10 lbs. pressure being maintained in the steam mains) with zinc covering, the air entering at the bottom and passing over the coil, the heating surface of which varies with the temperature required in the flues for the room. At about 5 ft. above basement floor, and in each flue, is an 8-in. by 8-in. hand-hole with glass panel, behind which is placed an anemometer, so that the volume and temperature of current may be seen by the engineer. The temperature is regulated by Tudor's fractional valve, which controls the quantity of steam passed into the coil; the volume is controlled by a damper, so that the flues can be closed altogether when the rooms are not in use. Both are worked from basement floor. Inlets into the rooms are at 8 ft. above floor, and larger in area than flue. It was intended to provide an inlet area, the full width of the flue and height extending from 8 ft. above the floor to the ceiling, and covered with fine wire gauze. This would have ensured large surface and slow movement. The present inlet arrangement seems satisfactory, and the only time that any current is felt is when the air supply is of a lower temperature than the air of the room. A diffuser prevents this: it is made by placing over the register-face a piece of wire cloth of very fine mesh, with area three times that of the register, bent in the form of a semi-cylinder, with its axis vertical, and closed at the bottom by a sheet of metal. The flues are taken up from the bottom to the top of the building, first serving as inlets, then securely stopped, the upper part doing duty for outlets for other rooms. Outlet flues have two apertures, one a few inches from the floor, and the other close to the ceiling. The lower one is exclusively used during the school year; the upper one would be used if the buildings were occupied in the summer.

The inlet apertures are larger than the outlets, so as to give pressure against outside

and prevent in-draughts; as far as possible, the inlet is placed in the interior wall, with the outlet on the same wall and as nearly below it as practicable. The discharge into the outer air is at 5 ft. above roof; at the top of the outlet is a damper to be closed at night to lessen the loss of heat from the building, and the chilling of the flues themselves. An inlet to admit 1,500 cubic feet of air per hour per occupant is allowed for the lecture and recitation rooms; 2,000 for physical laboratories; 3,000 for chemical laboratories; 4,500 for organic laboratories; and 2,000 for other rooms. Inlet flues are arranged for this, and divided if required.

The engineer controls the heat and supply to each room. The temperature of all rooms is taken and reported to him at 8, 10, 12, and 2 o'clock each day, and the flue temperature is regulated accordingly. The temperature maintained in the rooms is about 65°. The engineer is furnished at evening with the weather prediction for the next twelve hours, and is responsible for the thermal condition of the building at the hour of opening, being under explicit orders as to steam and air supply for various conditions of weather, and furnished with a tell-tale register showing if the pipes are allowed to cool off, etc.

The water closets are in groups, with a covering forming a box; from the back of each basin, and near the top, is an open pipe; the foul air, when the closet is being used, being thus conveyed into a foul air duct and exhausted into outlet flue with steam pipes at bottom.

The results of this system of ventilation have been satisfactory on the whole; equable temperature being maintained with the traces of oppressiveness peculiar to steam-heating from overheated or burned air, and only a small proportion of CO_2 is found in the air after the rooms have been used. It has also worked economically, though various difficulties in the construction, owing to the ventilating system not being a part of the original arrangements, and questions of cost excluded the possibility of adapting the building to a typically economic system of ventilation. Professor Woodbridge and Mr. Tudor arranged this ventilation; the former going over the system with me.

Pittsburgh County Buildings.—For the jail, fresh air is taken from top of tower, passes over coils, and put under pressure by fans in a sub-basement, with sliding doors to regulate the quantity of fresh-warmed air in the cells. The air is extracted from each cell by flues with openings top and bottom (controlled from passage) connected with a large main duct in the basement, which is exhausted into a chimney with a smoke-flue from the boilers in the centre. In administrative buildings air is also brought in from a tower, passes over steam coils, then through a water-washer, and afterwards through other coils; it is put under pressure in sub-basement and discharged into the rooms at the floor line over direct radiators with gills, placed under the floors, and controlled from the rooms by fractional valves. There are outlets from the top and bottom of each room into flues, which discharge into roof space, and from there exhausted into a large flue, which has coils of steam pipes therein.

American Bank Note Building—Workshops.—Under centre of each block is a large

ventilating chamber to which air is brought down shafts, passes over a steam radiator, put under pressure by fan into large duct, and distributed to the rooms through galvanized iron ducts, 24 in. by 6 in., with inlets at about 8 in. from ceiling, with hoods over to spread the air. There are outlet vents, with openings at top and bottom, at the opposite side of the room to the inlet; these are exhausted into a large flue.

State Hospital for Insane, Norristown, Pa.—Here there is a fresh-air chamber under the corridor, with an opening at the end, with a separate flue to each cell, having a steam radiator at the bottom. The outlets from the cells are into flues, with openings near the floor for winter extract. These flues are connected with the foul air duct in the basement, which is exhausted into a chimney with steam pipes at the bottom. In summer, vent openings are used at the top of the cells with flue discharging into roof space, which is ventilated by louvres. This has been found to be satisfactory, and the fan, which was intended to put the fresh air under pressure, has been found unnecessary.

Canadian Parliament Buildings, Ottawa.—This building is situated on the top of a hill. The fresh air supply is through tunnels cut in solid rock, with openings in hill side. It was expected that these would be of sufficient draw, with steam radiators at the bottom of the inlet flues to the rooms, but it is not at all satisfactory, and the system of Sturdevant's fans was introduced. Into the Meeting Chamber the warmed air is forced at the level of underside gallery floor. It is extracted through grids in the floor into foul air ducts by means of fans, and exhausted into a large flue, in the centre of which runs the boiler flue pipe. Over each gas ring is a galvanized iron tube connected with a pipe, which increases in diameter as it takes outlets, and is exhausted into a ventilating tower in which is a coil of steam pipes.

Jarvis Street Baptist Church, Toronto.—Amphitheatrical in plan, the floor is saucer-shaped. There is large basement, with two hot-air stoves having inlets for the heated air into the church at highest points of floor. The foul air is extracted from the floor level; at each bench end is a trefoil opening, connected by small tubes into the main trunks in the basement, which increase in size, and are exhausted into a large vent-flue, in the centre of which run the flue pipes from the hot-air stoves. Roof ventilation for summer use. This is said to be very successful.

McVicker's Theatre, Chicago.—The fresh air is taken from 60 ft. above ground into a ventilating chamber adjoining the theatre, and then drawn through a cotton filter and over steam coil in winter and an ice chamber in summer; forced into the auditorium by a fan through pipes opening at various points in the ceiling. It is extracted through openings in risers of the floors into collecting chambers, and by large ducts to slow running and noiseless fans located between the ceiling and the roof, and then exhausted by outlets through the roof. The air in the auditorium is changed every fifteen minutes. The theatre is lighted by incandescent electric lights. There are no fixtures, but lamps form part of the decoration scheme.

St. Paul's Roman Catholic Church, 9th Avenue, New York, has a basement, 17 ft. high, under the whole area. Under the atrium is a heating chamber, with an opening from the basement, the size of which is regulated by a curtain. In the heating chamber is placed

a large stove, the smoke and heat from which first passes through a large flue, then through four stacks of pipes 7 ft. wide (about 1,000 lin. ft.) and afterwards into an outlet smoke flue. The air passing through this chamber is warmed, and passes into the nave by a large opening, 11 ft. dia., and boarded round 7 ft. high. The circulation with the basement is by grided openings in the floor at the altar end. There are about two million cubic feet of space in the church. In the coldest weather 55° is easily maintained when the church is empty. The church, generally crowded, is found to be comfortable. The clerestory and basement windows are opened after each service. This system was adopted from economical motives, and answers well.

General.—The system of down draught ventilation, where the fresh air is obtained from a high level, is used in many public buildings with success, but is not available for rooms in which gas is burned. Warm fresh air is forced in at the ceiling level and foul air extracted at the floor level, with exhaust fans or otherwise, into flues. The extracts at the floor level into outlet flues are ordinarily used for cold weather however the warm air may be introduced into room: this removes the impure air which is found in greatest quantities near the floor, and does not allow the heated air to escape before being used. Owing to the dryness of the atmosphere in the winter and the greater evaporation from the body, it is necessary to keep a higher temperature in the rooms than is the case in England.

Heating by indirect radiation is often adopted for houses, fresh air being taken from sub-basements or ducts, passes over a steam heater at the bottom of flues which discharge the fresh air thus warmed into rooms.

The difficulties with and objections to steam heating, particularly by direct radiation and on the high pressure systems, are partially removed by the use of Tudor's Fractional Valve, which regulates the amount of steam passing into the pipes. In the Canadian cities many steam-heating apparatus have been taken out and hot water systems put in. Hot water heating with wrought-iron piping and coils (the radiating power of wrought-iron being 12 per cent. greater than cast-iron) is found to be the most pleasant, healthy and economical, and is being largely adopted. Several American houses are fitted up with hot-air furnaces, with supplies to separate rooms. The best are steel plate furnaces, where all the flues and interior construction are covered by a drum or radiator of malleable steel plate made gas and dust tight. Cast-iron furnaces are found to be very objectionable, the porosity of cast-iron and the presence of exposed joints, allows the escape of smoke and gas and fouls the air. From experiments made on buildings in Boston heated by steam, hot-water pipes and the best warm air furnaces, the humidity of the warm air delivered from the furnaces was said to be from 10 per cent. to 20 per cent. greater than from either the steam or hot water apparatus.

Open fireplaces are found in the best houses. Ventilating flues with extracts top and bottom of the rooms are much used. An attempt made to introduce vertical ventilating tubes, with inlet from outside air, has resulted in the inlets being made up.

All systems of ventilation and heating are, to a great extent, dependent for their success on being properly used and regulated. In one of the buildings visited, which

has a very complete system, complaints had been made as to its inefficiency, and fresh outlets had been arranged. On my going into the roof to inspect the main outlets, I found that one was closed completely, and had evidently been unopened for some time!

Heating and Ventilating by the Sun's rays.—Professor Morse, of Salem, acting on the fact that black and rough surfaces are the best absorbers of heat, designed the "Sun's Rays' Heater and Ventilator," the most extensive application of which has been made to one of the upper rooms, where books are stored, at the Boston Athenæum. It has been in use for several years, but on the occasion of my visit I found some little difficulty in finding the inlet, it having been, like many other ventilators, closed. This ventilator is a box 42 ft. long and 6 ft. 6 in. wide, with inlet of 4 square feet; it has an 8 in. ventilating space, then black material with 3 in. space between black surface and outside glazed framing. On opening the inlet shutter, I found a very strong current of warmed air pass into the room, and as the sun was shining on to the ventilator this continued. Experiments have shown that with a temperature of 55° in the sun at the mouth of heater, the temperature at upper entrance was 97°. In four hours 313,000 cubic feet of air were discharged into the room. The cost of the heater is £55. Other heaters are made and placed in the ordinary window sash. There is also a heater to a room in the Museum at Salem on a similar principle to the one just described, but of different construction. This method of heating and ventilating by sun's rays is of service in the case of churches, halls, &c., which are only occasionally used. Fresh warmed air could be discharged into them when the sun shines, and the damp and drowsy atmosphere, so often found in such places, would be removed.

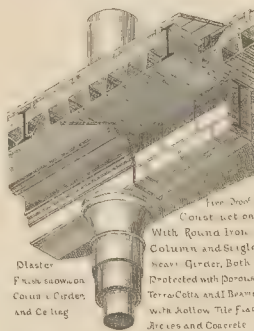
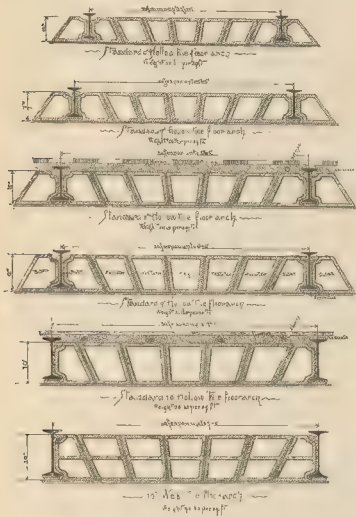
A NOTE ON AMERICAN ARCHITECTURE.

The best of the modern architectural work I saw possesses great originality and interest, and it has considerable value from an artistic point of view. The illustrations which I have collected, many of which I have presented to the Library, will give some indication of this. It would be to some extent invidious to refer to individual architects or to particular buildings, but the growing preference for the Romanesque style may be noted. This is mainly due to the influence of Mr. H. H. Richardson, of Brookline, Mass., who has designed many fine buildings in this style. Several of the residences recently built are very good, the interiors being treated in a manner at once novel and effective. In street architecture and store buildings, cast iron fronts are now generally abandoned, and though iron is still used constructionally, it is encased in brickwork or terra-cotta. The impression, however, which the illustrations give of the artistic qualities of some of the recent work is very much strengthened by examination of the actual buildings, and by intercourse with their architects. During the last few years American architecture has taken quite a new departure, and its progress has been very remarkable. As the Americans have only recently developed a characteristic and important literature of their own, so too their architecture has begun to exhibit artistic and peculiar qualities of a very high order, and worthy of our careful attention. Its most promising characteristic seems to me to be its originality. The best specimens of

it are scholarly and refined in detail, but adhere less slavishly to precedent than European work, and new combinations, dictated by and growing out of the necessities of the building, are introduced. Selecting a style in which to work, an American architect is less fettered by tradition than his European brethren, and though in no way violating its character, often employs it in a new and original manner, and with truer regard to its principles. His work is accordingly more living and interesting, less the production of a dry-as-dust archæology, and more in accordance with the true principles of all great architecture.

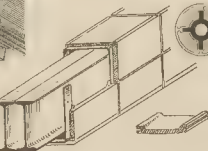
It must be admitted, however, that except in the hands of the few best men, the desire for originality often leads to very painful and deplorable results. Even the more "orthodox" work of the older architects is too often vulgar and pretentious, with much superfluous and bad ornamentation, and the ordinary "Gothic" work of the country is rarely successful. But it must be remembered that architecture has only become a recognized profession in America within a comparatively recent period. Its rapid improvement, the conscientious, scholarly, and at the same time original work of its best men, the growing and rapidly extending public taste for works of the best class, all seem to me to be very promising signs for the future architecture of the country.

JOHN B. GASS.

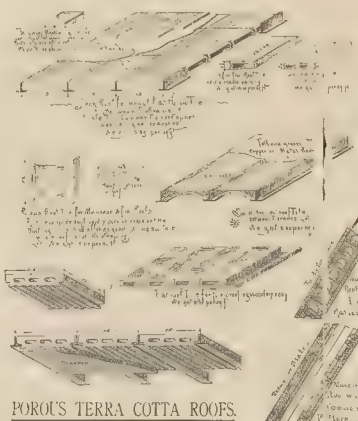
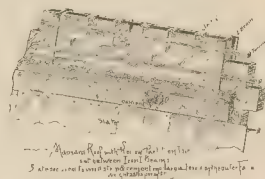


HOLLOW TILE FLOOR ARCHES

BEAM PROTECTION.

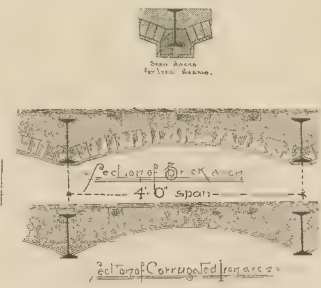
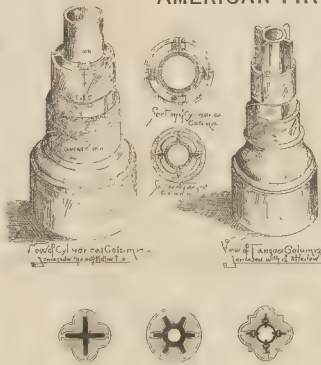


ENCASED IRON COLUMNS

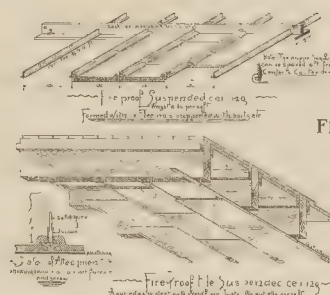


POROUS TERRA COTTA ROOFS

AMERICAN FIREPROOF CONSTRUCTION.

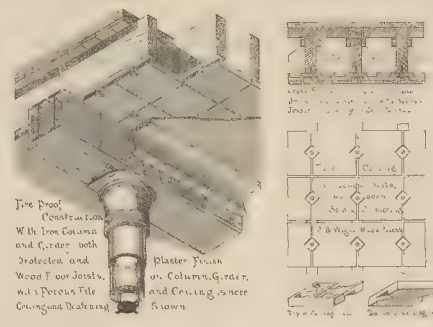


BRICK & CORRUGATED IRON ARCHES

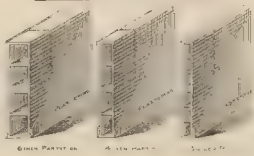


CEILINGS MADE OF FLAT FIRE CLAY TILES

POROUS TILE CEILING ON WOOD JOISTS



HOLLOW TILE PARTITIONS

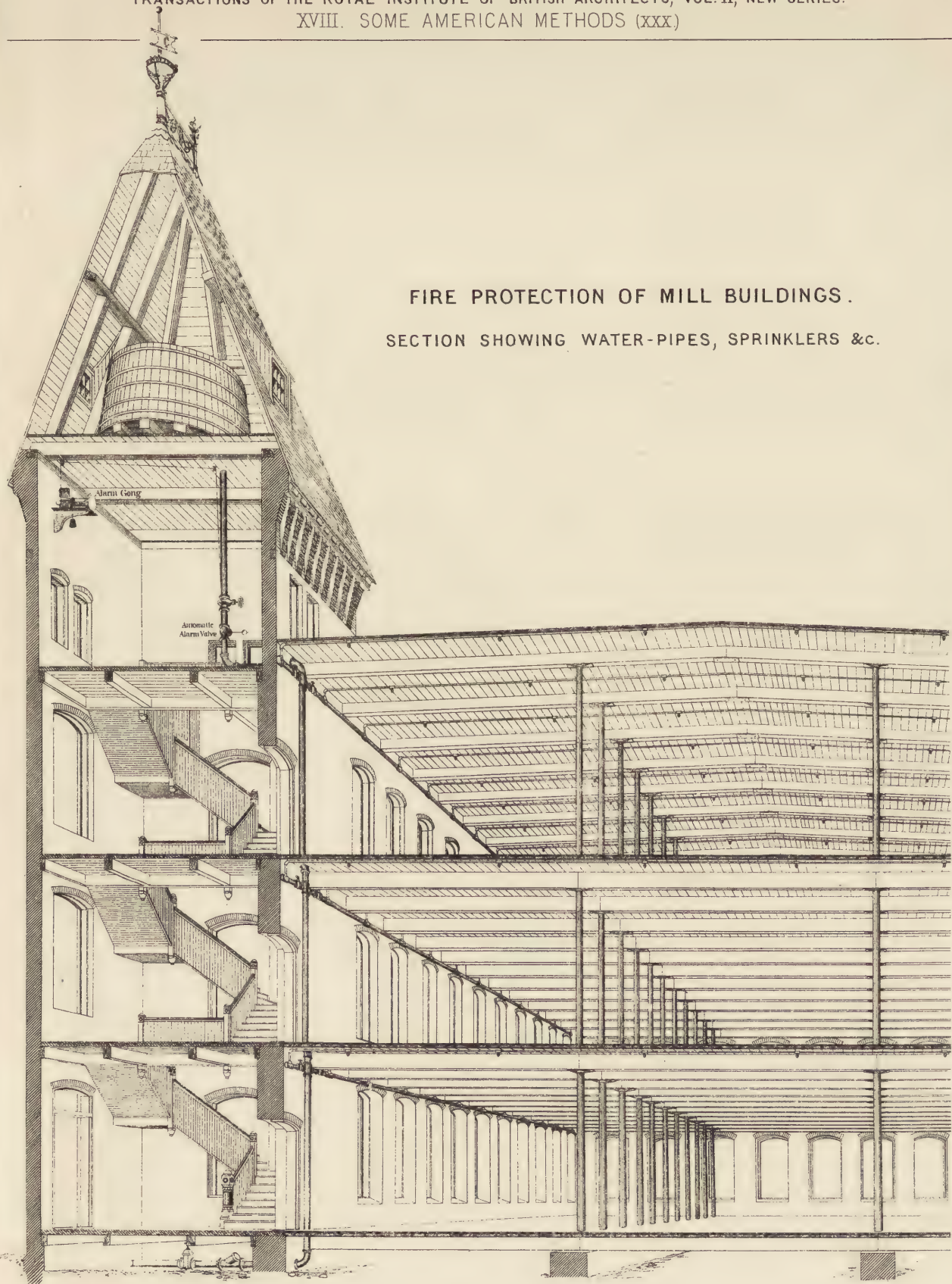


HOLLOW TILE PARTITIONS

Back of
Foldout
Not Imaged

FIRE PROTECTION OF MILL BUILDINGS.

SECTION SHOWING WATER-PIPES, SPRINKLERS &c.





XIX.

THE GODWIN BURSARY: PORTIONS OF REPORT OF A VISIT
TO THE UNITED STATES OF AMERICA AND TO CANADA.By JOHN B. GASS, *Associate*.

[Addressed to the Council of the Royal Institute of British Architects, October 1885.]

MR. PRESIDENT AND GENTLEMEN,—

I VISITED, in the United States, New York, Boston, the Cotton manufacturing districts of New England, Newport, R.I., Philadelphia, Washington, Chicago, Buffalo, Albany, Saratoga, and other cities. In Canada I visited Toronto, Ottawa, Montreal, and Quebec. I was absent from England nearly three months.

OFFICE BUILDINGS.

In many cities of the United States the office buildings are of great height, from ten to thirteen storeys. Each storey 11 ft. to 13 ft. clear. In New York city a recent regulation has been passed limiting the height of buildings to 70 ft. in streets 60 ft. wide, and 80 ft. in all wider streets. In Chicago, particularly, the high office buildings have the advantage of centralizing the offices which are thus brought within short distance of each other. All these are built much on the same general lines. The outer walls are of brick with stone or terra cotta dressings. In the Home Insurance Company's building, iron columns run up the full height in the centre of brick piers; iron window lintels rest on the columns. It is of fire-proof construction, with cast iron columns and wrought iron girders encased in terra-cotta; the floors are arches of hollow tile, wooden flooring on sleepers above. Internal partitions are of hollow tile, which being light can be set on floors at any point, and the offices are divided and made the size required by tenant [Illustn. xxxi.]

The main entrance is on the ground floor, into a large central hall in which is a notice board with a list of the tenants and the location of their rooms. Wide incombustible staircases, well lighted, go up to the top of the building, with wide and generally well lighted corridors leading to the offices. The elevator service adjoins the staircases. These elevators are hydraulic, and placed in groups with motive power in the basement; in the North-Western buildings six elevators are running continually at a speed of up to 500 feet per minute. They are under the charge of attendants, have a safe lifting capacity much in excess of any load that can be got into the car, are easily controlled, with an automatic stop for the top and bottom storeys, and with various automatic safety devices. They are regularly inspected by the makers, and the running is guaranteed.

Fire-proof vaults, built up in internal tower form, are provided for tenants; and there is a letter shoot on each floor to large U.S. mail box in basement. The toilet rooms are variously arranged; each suite of offices has generally a lavatory attached, clean towels being supplied by a company formed for that purpose. In the "Home" building, private toilet rooms are provided for the offices in the basement,

and first storey ; on the third, fifth and seventh floors there are dressing and toilet rooms for women, many of whom find employment in offices ; on the second, fourth and sixth floors are the urinals. On the eighth floor, the alley wing is devoted to a well appointed toilet room, where there are w.c.'s, urinals and washing basins, with servants and boot blacks constantly in attendance.

The heating is by steam at low or high pressure, direct radiation ; steam boilers, for safety, are generally placed outside main building. Many offices have separate gas heaters or open fire places. The lighting is by gas or electric light ; in some cases wires for electric lights follow all gas pipes, with dynamos on the premises, so that tenants have a choice of light. Most offices have direct telephonic communication. The rent often includes janitor service and care of rooms, &c. Halls and corridors are patrolled at all hours by watchmen. An usher to answer enquiries, and with police powers, maintains order in the lower hall.

In the Pullman Building, the seventh, eighth and ninth storeys are let off as residential apartments, with restaurant, private dining rooms, &c., and the tenth storey is used for kitchens and storage. Each suite of apartments has direct communication, by speaking tube, with apartment entrance from street and the restaurant.

The Liverpool, London and Globe Insurance Company's Buildings, at Philadelphia, are six storeys high and basement. Heights, floor to floor, 15 ft. 9 in., 13 ft. 5 in., 12 ft. 3 in., 11 ft. 8 in., 11 ft. 8 in. and 10 ft. 6 in. Outside walls are of stone, inside of brick ; safes are built adjoining the outer walls to the full height of the building, arched with concrete floors, and with a cavity to inside brick lining. Floors are of mill construction. Elevators run on guiders only, not cased in.

COTTON MILLS.

In New England the cotton manufacture is carried on mostly by large corporations, somewhat similar to our limited liability companies. In the Philadelphia district by private firms ; there are also several mills in the Southern States. Many of the corporations have very large concerns, most of them taking in the raw cotton, and turning out finished goods, doing the spinning, weaving, bleaching, finishing, dyeing and printing. The sites have generally been chosen so as to control a good water supply, which, in many instances, allowing considerable fall, is utilized for the driving ; canals being constructed at varying levels so as to give sufficient "head" for turbines. At the Cohoes Mills, N.Y., the water is used at six different levels. All the works visited have grown from smaller dimensions, and although generally conveniently arranged, have not been planned as a whole, particulars were therefore taken of the latest mill-building at each concern. The mill-buildings are generally four to six storeys high.

The picker or scutching-room is in a detached building, or, if in the mill block, is fireproofed ; the cotton mixing room is in some cases over the picker room, in others alongside ; the cotton store is a detached building. The card and preparation room varies in position : in the Hamilton Mills, Lowell, which are most distinctively American, it is on the top floor, the lap machines being in the third storey, to which the cotton is sent by flues from the pickers, and the laps by elevators to the card room. In other cases, the card room is in the third storey, with weaving in the two storeys below, and the spinning frames above ; the thread mills have the carding on the ground floor. The card room is always boarded. Weaving is done on the ground and second storeys, the looms on the two floors being driven from one line of shafting ; the mills not being of great width allow of this arrangement, although in some cases it is necessary to have the electric light in the middle of the mill the whole day.

Large mills have two staircases, one at each end. The staircases are of hard wood, and average about 10 in. tread and 7 in. rise, and 4 ft. to 4 ft. 6 in. wide. For additional exit in case of fire are outside fire escapes, many of which are made with large landings railed round, and in some cases, instead of the iron ladder there is an arrangement of steep iron steps, or 1½ in. wooden steps on iron framing, all painted black, with handrail.

Elevators are sometimes in detached towers, though often they open directly into the large rooms with self-closing hatches. Closets are large and numerous, being placed in projections ; usually water troughs emptied at intervals. At the Conant Mills the closets are arranged so that all the soil drops directly into a pit at bottom, which is emptied weekly and said to be generally free from smell. The heat of the spinning rooms draws in the smell of closets, and unless special precaution is taken they are apt to be very offensive. Wash troughs are universal.

Wardrobes, with separate compartments, are provided for the clothes of the workpeople, who are allowed fifteen minutes "fixing time" before the machinery is stopped. The American mill hands are very well dressed outside. Several of the Corporations have boarding houses under their control for their hands, besides owning much of the dwelling house property near the mills.

One-storey Mills.—Where the area of site is not limited, one-storey mills with monitor lights are built, and are specially advocated by Mr. Atkinson, of the Mutual Insurance Co. Some have been recently built, though I did not hear of any widespread feeling in their favour.

The advantages claimed are that they are safer from fire, better for arrangements of machinery and overlooking, and better for light and ventilation, without any difficulty as to temperature; that there is greater stability and less vibration to machinery, therefore less wear and tear and greater speeds possible. The cost is about 75 cents per square foot, this varying very little from the many-storeyed mills. See description of the Willimantic and Lorraine Mills. The rooms in all mills are kept particularly clean and free from dust.

Heating.—Heating is effected by exhaust steam from the engines, or by high pressure steam direct from boilers; where the driving is wholly by turbines, special boilers are provided. In many mills the steam pipes are overhead, three or four rows of $1\frac{1}{2}$ in. or 1 in. wrought iron pipes lying side by side in a horizontal plane, and running round the rooms about 2 ft. from walls and ceilings, the moving machinery keeps the air in motion. Overhead heating is said to give much more uniform results, and to be more economical than with the pipes placed near the floor. In Canada, where the variations of temperature are very great, it is quite successful. There is less danger than from the lower steam pipes, which cause fire by assisting spontaneous combustion of oily fibre, &c.; combustible matter on steam pipes is one of the greatest sources of danger of fire. The top storey has often an additional row of pipes. Where steam pipes pass through floors metal casings are sometimes used. Except at the Willimantic one storey mill, I did not see any attempt at ventilation, but by doors and the sash windows. The electric light is in general use.

Driving.—Advantage is always taken of a convenient water supply to utilize it for driving by turbines, but in many of these cases they have supplementary steam engines. The steam engines are often very fine and large, and leather belting is invariably used, there being no rope driving. At Willimantic the driving is by high pressure steam engines directly on to the main-line shafting. The shafting is generally light, and in some instances of great length. Looms and ring spinning frames being placed directly over each other, one line of shafting drives the machines on two floors. In the one-storey mills visited the shafting is in basement, all the machinery being driven from below.

Belt chambers are often of wood, the main belting running into mill, and being cased with wood. These have been found to be a source of danger from fire, and belt chambers are built of brick in new mills.

Many varieties of boilers are in use. The Corliss upright boilers, with doors all round, and the Babcock & Wilcox boilers give good results and little smoke without economisers. The Jarvis setting of boilers is highly spoken of; air is admitted by small flues in the front, and then conducted through a number of horizontal expanding ducts in which it traverses backwards and forwards until it finally, and in a heated state, enters by the bridge wall and sides of the furnace in jets through fire-brick plates, uniting with the products of combustion and causing consumption of the gases.

Cotton spinning requiring a moist atmosphere, and that of America being dry, moisteners are required which, by a special machine, discharge into each room, through heads placed at intervals, a spray of steam in winter and a very fine spray of water in summer. At Willimantic moisture is given to the atmosphere by means of plants in a deep bed of moist soil in each window bottom. The amount of electricity in the air in dry cold weather is a source of trouble, especially in Canada, and many breakages of threads occur from this cause.

The Pacific Mills, Lawrence, Mass.—Make cotton and woollen fancy goods, and consist of 23 mills and buildings; 46 acres of machinery and storage; 142,000 spindles for cotton; 26,000 worsted spindles; very large number of looms. All the cotton machinery, except slashers, is of American make, counts 30's to 50's, all ring frames. The worsted machinery is all English make. The latest mill is six storeys, 73 ft. wide outside, ground floor 16 ft. floor to floor, four storeys 13 ft. floor to floor, and the top storey 15 ft. to square. It has 10 ft. bays, beams not more than 23 ft. long; walls, brick, 28 in. for two storeys, 24 in. for two, 20 in. for one, and 16 in. top storey—recesses on the outside, one brick deep

under window-sills. Iron columns $8\frac{3}{4}$ in. diameter $1\frac{3}{8}$ in. metal on ground floor, decreasing $\frac{3}{4}$ in. in diameter and $\frac{1}{2}$ in. in metal on each floor. Tar and gravel roof with slope $\frac{1}{2}$ in. to 1 ft. Cost about 80 cents per square foot of area. The picker room is in the basement, the ceiling and doors being covered with magnesio-calcite for fireproofing. The driving is by turbine wheels of 5,000 horse power and steam engines. All belt driving.

Hamilton Spinning Co., Lowell, Mass.—Make plain goods, finish for market. New mill 355 ft. long, 75 ft. wide outside, six storeys, each 14 ft. floor to floor. Bays 8 ft., window sashes 4 ft. 10 in. wide, 3 ft. 2 in. piers; window-sills 16 in. from floor, walls 32 in. at bottom, 16 in. at top. Picker room on ground floor all woodwork covered with bright tin plates. Cotton room over scutching room and passage; from the passage cotton is unloaded through a trap-door. Card room and preparation are in top storey. Cotton is sent from pickers up flues through the cotton room to the lap machines in third storey, then by elevators to card room. Combined cards and railway heads. The ring frames have each 208 spindles; in old mill are some mules, but these are going to be removed. Weaving in the lower storeys, double driving from one line shaft; water power driving; supplementary Corliss engine. All new machinery is of American make. The roof is flat, tar and gravel, with parapet and galvanized iron rain-water pipes.

Merrimack Mills, Lowell, Mass.—Make fancy goods; have a large staff of designers and printers; 156,000 spindles, 4,400 looms. The widest mills are 72 ft.; 12 ft. 6 in. to 14 ft. floor to floor, 8 ft. bays; windows, 4 ft. 6 in. wide, top 1 ft. 6 in. below ceiling; walls, 2 ft. 6 in. on ground floor, with cavity all the way up. Cost of last mill 60 cents per superficial foot. Heated by pipes under the sills. Picker room is in a separate building; one room for all the mills, laps being conveyed in waggons. Weaving done in the lower storeys. The spinning rooms are above preparation rooms. Ring spinning frames and weaving each in two rooms and each pair driven from one line shafting. Turbine driving, main shaft 800 ft. long, 8 in. diameter at turbine, expansion couplings; 6,000 horse-power steam engines for supplementary driving; 13 Corliss upright boilers, with doors all round, no economisers; soft coal is used, and there is no black smoke. The chimney is 285 ft. high, with cavity inside, lining not tied to outside.

Harmony Mills, Cohoes, New York.—Make all sorts of cotton goods finished for market; 280,000 spindles, 7,500 looms. The latest mill is 1,100 ft. long, division wall in centre, built at twice; 75 ft. wide, divided into three bays; bays 10 ft. centres. Roof asphaltum; old pitch and gravel roofs have been good for twenty years. In the new part the picker room is in the basement—galvanized iron arches, filled in with cinder concrete. Cards combined in basement, and also in third storey. Weaving is done in the ground floor and second storey; the looms are put crosswise. In the new part, ring spinning; in the old part, mules. Driving is by water power: main shaft 8 in. to 5 in.; one room shaft 3 in. to $2\frac{1}{2}$ in.; greatest length 550 ft. The shafting is not rigidly bolted.

Hochelaga Cotton Spinning Co., near Montreal, Canada.—Built 1871 and 1880. Goods finished for market. 100,000 spindles, 2,000 looms. Basement and four storeys high—basement walls, 3 ft. 6 in.; ground and second stories, 30 in.; third, 24 in.; fourth storey, 20 in. 'Mill' construction; all double window sashes. Roof has projecting eaves, no gutters. Overhead heating, four rows of pipes; very successful even in coldest weather, steam runs through at night. Picker room and cotton mixing room are a detached building. Looms, basement and ground floor; preparation, second storey; ring frames, third; and mules, fourth storey. Spin 30's to 60's. Mills insured in the American Mutuals.

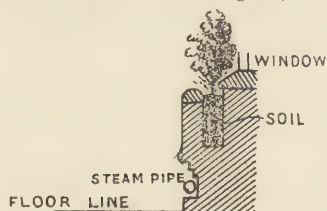
St. Henry Cotton Manufacturing Co., near Montreal.—Mill 301 ft. long, 75 ft. 4 in. wide; three bays wide, 9 ft. 6 in. bays length. Basement, 9 ft. floor to floor; ground floor, 14 ft.; second storey, 13 ft. 6 in.; third storey, 15 ft. 7 in. to underside roof. Iron columns, plank floors; roofs patent cement. Water all taken from centre of roofs through internal rain-water pipes. Picker room detached; preparation, top floors. Mules, lower floors, run lengthwise.

Conant Thread Co., Pawtucket, R.I.—125,000 spindles for spinning, wholly thread making. Five mills, latest built 1881; outside length 484 feet or 45 windows; 105 ft. wide; 4 storeys and basement, bays 10 ft. 6 in. Heating, steam pipes under sills. Picker room in separate two-storey building. On ground floor, preparation; combined cards, and railway heads. Cotton goes through two sets of cards. Second floor, thread making machines; third and fourth, spinning, Dobson's mules, 800 spindles, crosswise; spin from 80's to 130's. Basement used for storage only. Driving, three Corliss engines; two combined 1,000 horse-power drive the two lower floors, one 400 horse-power the two upper floors.

Shaft in card room 5 in. diminishing; main driving belts 42 in. wide; two on each main pulley, enclosed inside rooms in wood casings; to upper storeys where going through roof of engine house, and outside main wall of mill cased with wood. Iron pillars used to support shafting, the rest wood. Sprinklers, Conant's patent, cotton yarn binding in place of sensitive solder. Water towers at each end, each holding 30,000 gallons.

Clark Thread Co., Newark, New Jersey.—80,000 spindles for spinning; wholly thread making. Mills: the new mill card room, length 262 ft., width 120 ft.; five storeys high, bays 10 ft. 6 in., windows 4 ft. 6 in. wide, double sash windows, open blinds for sun; walls, 2 ft. 4 in. ground floor, 2 ft. second storey, no recesses under windows; 1 ft. 9 in. top storey; iron pillars 9 in. diameter on ground floor, 7 in. diameter in top room. Roof tin covered. Overhead heating, three rows of 1 in. pipes, four rows in top room. Garland's moistener, cold spray in summer, steam in winter. Picker rooms are detached buildings connected by bridge to main building. Card room ground floor, cards not combined; 3 ft. space underneath floor, which is of pitch pine boards, on joists. Roving frames and mules second storey, spinning rooms over. Dobson's mules, 1,000 spindles $1\frac{1}{4}$ gauge, spin from 110's down. Babcock Wilcox boilers.

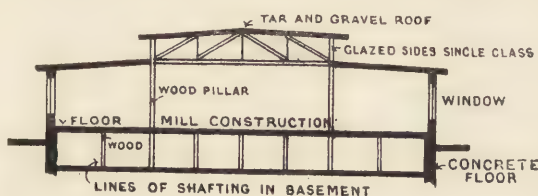
Willimantic Linen Co., Connecticut.—Several blocks of mill building wholly thread making. New mill 820 ft. long, 174 ft. wide, one storey high. Picker room in wing; preparation, 50,000 ring spindles, and thread making machinery in the mill. Basement 10 ft. deep, mill 19 ft. high to square, monitors above. Bays 16 ft. and over on working floor, 8 ft. in basement; eight bays in width. Walls: stone foundations, brick 24 in. thick to underside sill; brick piers 30 in. face to take roof trusses; tar and gravel roof. Between piers filled in with sashes having swings; lower half below transom rail, ground glass, upper half clear glass, above transom coloured glass. Inside each window bottom, plants with



SKETCH NO. 1.

soil, which help to moisten the atmosphere. Monitors divided; double glazed, ground glass inside, 2 in. space between sheets, inside sheet unscrews for cleaning, three swings each side of each monitor. Basement floor concreted with runs for shafting, which are covered with planks, and easily removable. Mill floor rests on wooden pillars, and of "mill construction." Boiler house in centre at back. Three pairs of engines in centre of basement (with large well-hole in floor over) drive directly on to the main lines of shafting, making 350 revolutions per minute; shafting 3 in. diameter at engines in runs in basement floor, with pulleys in pits; drive through floor on to machines— $2\frac{1}{2}$ in. belts, a few 3 in. Heating by overhead pipes, single line steam pipes near floor, with vertical double line 9 ft. high in brick piers, fresh air inlet behind same. Towers with water tanks for sprinklers, &c.,—Parmelee's sprinklers. Large entrance porches at each end of mill, with large bed of tropical plants in centre, and at each side clothes hanging spaces. Good dining room in a wing, very nicely fitted up and kept. This one storey mill, built as an experiment, seems to be on the whole a success. A record has been kept of temperatures, both in summer and winter, and compared with the four and five storey mills. It varies between two and five degrees, but generally not more than two, though there is very large glass surface. No difficulty with ends breaking; no leaks from roof. The driving with high speed engines, directly on to the main shafts, is not found economical. The mill is most attractive looking inside: the spacious entrance porches with their tropical plants, the windows with the flowering plants in bottom—though they do get rather cottony at the card room end—the large space so splendidly lighted, the coloured glass in upper part of windows, everything being kept beautifully clean, give the idea of an exhibition room rather than a regular workshop.

The Lorraine Manufacturing Co., Saylesville, R.I.—Several old mills. New worsted mill, 402 ft.



SKETCH NO. 3.

by 106 ft., one storey high. Basement 8 ft. high, floor concreted. Mill floor ordinary construction, beams supported on brick or wood pillars. Mill, 15 ft. to square; large monitor over whole of centre area, single glazing; tar and gravel roof. Heated by four rows of steam pipes about 2 ft. from underside beam. Temperature about same as other mills in summer and winter.

CHIMNEYS.

The Pacific Mill chimney [Illustrn. xxxii] is 205 ft. high above the ground. The outside casing of shaft is octagonal: 20 ft. outside diameter above base, 11 ft. 4 in. diameter at top. Walls 24 in. to 8 in., with ribs in centre of each side; brick cap. Built with both batter and entasis as marked on drawing. The inside core is circular, 8 ft. 6 in. diameter inside for whole height; 16 in. thick for 12 ft. high; 12 in. thick for 60 ft., and remainder 8 in. thick. The core is independent of outer shell, with air space between, this allows for free expansion and contraction without cracking the shell, and preserves a more equable temperature in the shaft. Foundations on sandy bottom, 22 ft. below ground to bottom of piling. Sheet piling, octagonal on plan, 40 ft. diameter and driven 5 ft. below concrete. Concrete bed 12 in. thick, and 42 ft. diameter, then solid ashlar stone 7 ft. thick with set-offs; above that a stone outside wall 6 ft. thick, and ashlar stone set-offs for base. Inlet for flue of very easy curve; iron lintels to opening. The chimney at the Merrimac Mills is of similar construction, and 285 ft. high. Chimney to Clark Thread Co. is square, and 192 ft. 6 in. to top.

COVERINGS FOR STEAM PIPES.

According to Professor Ordway's report and experiments on coverings for steam pipes, the best are those which consist chiefly of light fibrous or porous substances, such as hair felt, cork, magnesia, rice-chaff, and diatomaceous silica or "fossil meal." Those which consist of paste, or mortar, plastered on the pipe, are inferior, and complicated coverings are not so far superior as to warrant their extra cost. Hair felt should not be applied directly, but with a space between it and the pipe filled with some light powder; this space formed by plaster rings cut in halves, or flexible rings, and clamped on to pipe; it may have a case of thin sheet iron, tin plate, zinc, or straw board. The hair felt is wrapped outside with cotton cloth. Rice-chaff is used in the Southern States, and enclosed in cloth wrapper. The wrappings should not compress the coverings, or their efficiency is diminished. Slag wool would be good if it could be made of a silicious slag free from sulphide of calcium.

WORKSHOPS.

Singer Sewing Machine Works, Elizabethport, N.J.—Extensive works. Shops, 45 ft. wide inside; ground storey, 13 ft. high clear; second, 12 ft.; third, 11 ft. Walls, brick, 2 ft. 8 in. ground floor, 20 in. top floor. Columns, iron, except on top floor, wood. Floors, brick arches, 4 ft. 4 in. centres; 10½ in. by 4½ in. wrought iron girders resting on transverse wrought iron girders. Over the arch is concrete, in which 3 in. by 2 in. wood sleepers are bedded, and 1½ in. wood flooring nailed to same. Tar and gravel roof; iron staircases.

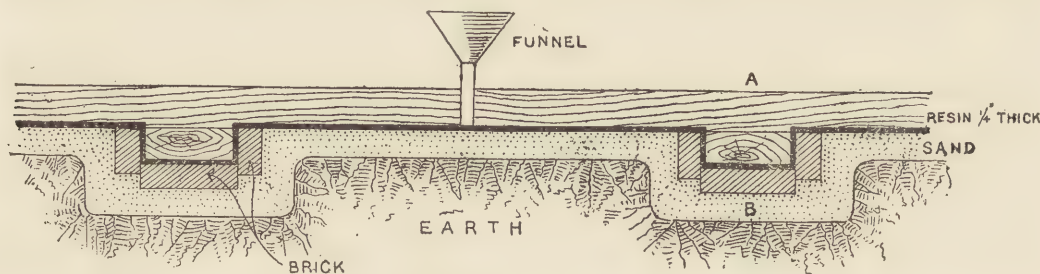
Brown and Sharp Manufacturing Co., Providence, R.I.—Main workshops 291 ft. long, 8 ft. bays, 46 ft. 6 in. wide inside (two bays). Storeys 13 ft. and 12 ft. 6 in. clear. Windows 4 ft. 6 in. wide; 3 ft. 6 in. brick piers. Iron columns, basement, 8 in. diameter; ground floor, 8 in. to 7 in.; first, 7 in. to 6 in.; second, 6 in. to 5 in., made so as to serve for rain-water pipes, with outlet at bottom. Inside wholly coated with tar. Floors, 4 ft. span brick arches (plastered on soffit), on wrought iron girders, haunches levelled up with concrete; above this 3 in. tongued and grooved planks with 1½ in. tongued and grooved spruce flooring laid diagonally, and finished flooring of 1½ in. yellow pine boards. Roof arched and concreted, laid with slopes to centre, every fourth column serving as rain-water pipe, with galvanized iron outlet cover: four sheets of tarred paper laid on concrete, and above tar preparation and gravel.

Western Electric Co.'s Building, Chicago.—Workshops 45 ft. (three bays) and 53 ft. (four bays) wide inside; columns 15 ft. centres. Basement, 9 ft. 2 in. clear height, used for storage and cable manufactory; ground floor, 12 ft., offices, stores, and cabinet making; second storey, 11 ft., machinery department and cabinet finishing; third story, 11 ft., instrument department and insulating room; fourth storey, 11 ft., assembling department and japanning room. Cast iron columns: basement, 10 in. diameter, other floors, 9 in. diameter; wrought iron girders, ends resting on shelves at top of column, and having 2 in. by ¾ in. wrought beam ties running through slot in column, and bolted to beam ends by ¾ in. bolts; 12 in. by 3 in. wooden joists resting on beams at 12 in. centres, and thick floor boards. Fireproof doors, two doors of wrought iron; four steam boilers; chimney 122 ft. high, built circular,

52 in. diameter inside at bottom, 55 in. at top, iron ladder inside. In other workshops the wooden joists are covered on the under-side with porous terra-cotta, galvanized iron, or they are plastered.

WOODEN FLOORS ON EARTH FOR WORKSHOPS.

In the wooden floor laid on earth, as shown in the sketch No. 4, the ground is levelled and earth removed to necessary depth; 2 in. spent moulding sand spread over the surface; troughs for wood sleepers made with dry bricks laid in sand; sleepers placed in, and melted resin poured in so as to go all round. Floor planks laid upon the sleepers, $\frac{1}{2}$ in. above the top of sand, with 1 in. by $\frac{1}{2}$ in. wooden



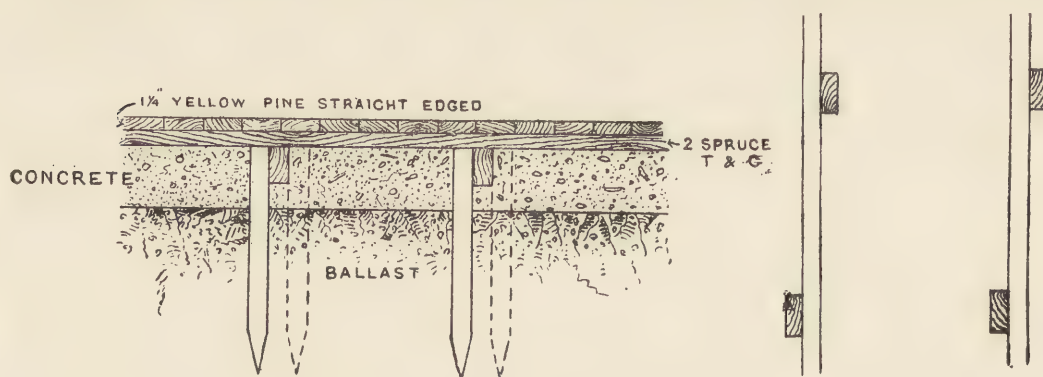
SKETCH N^o 4.

strips between sleepers. Holes are bored in the floor planks about 4 ft. apart, melted resin poured through and flows underneath. Top floor laid on planks. This floor, which has been laid for over twelve years at the workshops of Messrs. Sellers & Co., Philadelphia, is now in excellent condition, no repairs have been needed, and there are no signs of rot.



SECTION A.B.

The floor, as sketch No. 5, is excavated about 16 in. below floor-level—6 in. dry ballast. Heavy stakes driven in about 3 ft. apart, sleeper joists being nailed to and levelled up at 6 in. above ballast. Concrete filling well rammed, 5 in. thick, made of coarse gravel, coal tar and pitch, finished on top and levelled up to top of sleepers with fine gravel coal-tar concrete, well rolled. Gravel perfectly dry; hot,



SKETCH N^o 5.

distilled, or refined coal-tar and pitch used. Timbers for flooring, 2 in. spruce, coated with hot coal-tar on underside before laying, and nailed to sleepers; $1\frac{1}{4}$ in. yellow pine boards form top floor. Similar

floor to this laid eighteen years ago at the works of Pratt & Whitney Co., Hartford, Conn., now in good condition. It is found that timber laid in, or planks laid over, cement or cement-concrete put on earth, rots rapidly. The timbers and planks laid this way at Pratt & Whitney Co. were completely rotted in about ten years, and had to be renewed, causing considerable expense in the moving of machinery, besides much annoyance.

FOUNDATIONS.

Chicago is built on the banks of Lake Michigan; the rock crops out about two or three miles W., and five miles S. of the lake, the dip being filled with alluvial deposit varied in composition—sand, soft clay, hard clay, or gravel. The business portion of the city is mostly on soft clay with hard bed near surface. This will bear a weight of from two to three tons per superficial foot (dependent on formation) with a settlement of from two to three inches. The foundations have, therefore, to be equally loaded to allow for equal settlements, and consequently they are resolved into a number of separate piers, the area of base being dependent on the load on the pier.

Foundations are constructed in various ways. Where a basement is required, and foundations not sunk to great depth, a concrete bottom, 12 in. to 18 in. thick, is formed; then a course of large stones; on the top of that, webbing of railroad iron with concrete filling—this distributes the load, and enables off-set of 2 ft. to 3 ft. to be made. To the Home Insurance Buildings there is a bottom of concrete 18 in. thick in two layers, with 3 in. onset dimensioned stone 14 in. thick; with 12 in. onset on that rubble 12 in. thick, having, with a 5 in. onset dimensioned stone 10 in. thick, on the top of which is placed the wall with 12 in. onset, the footings thus having 2 ft. 8 in. projection on each side wall.

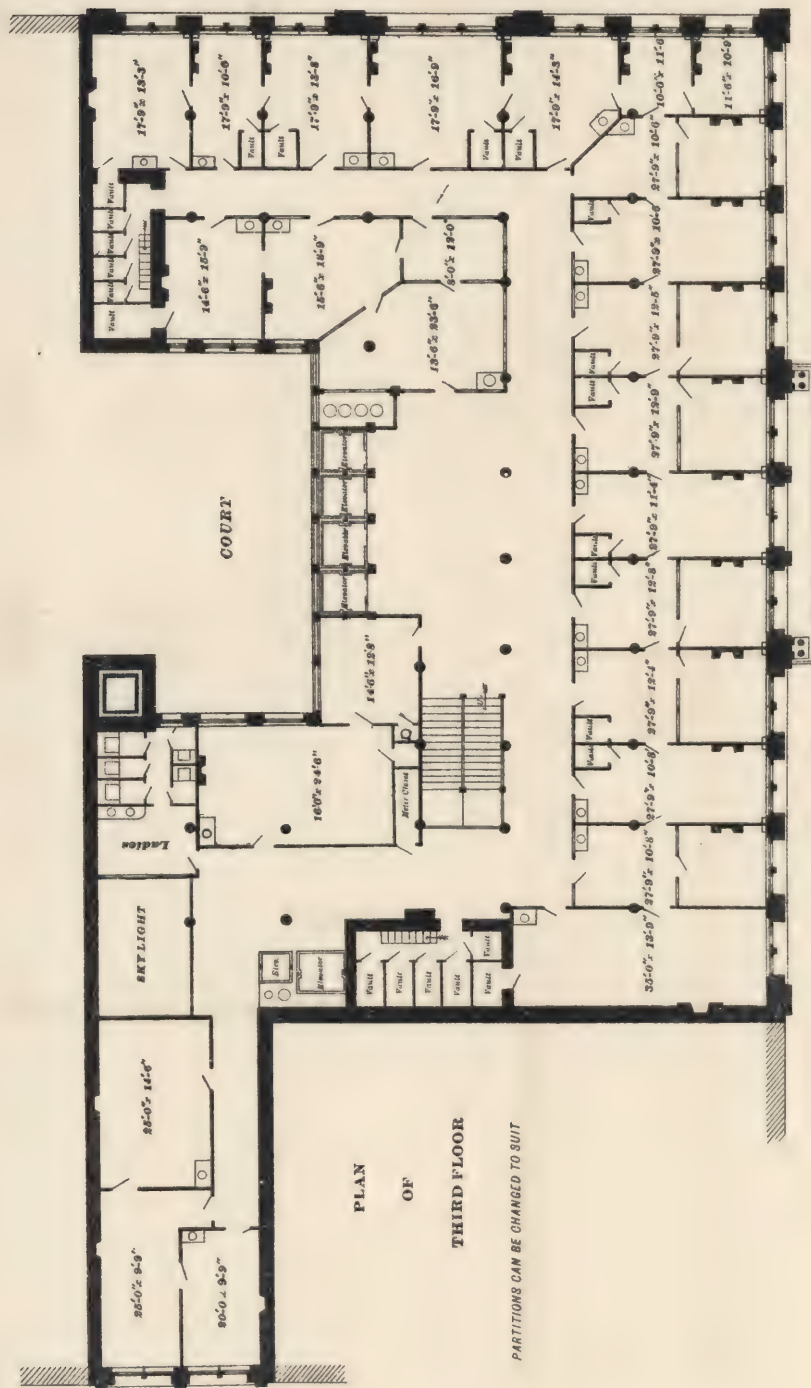
In Board of Trade building, excavated to 4 ft. below sewer, at the bottom is a layer of 3 in. oak planks, bedded in cement, then a tier of 12 in. by 12 in. oak beams, 12 in. apart, and filled in with strong cement concrete, three of the beams interlocked into adjoining pier. Above the beams 3 in. oak planking spiked to them, and on that 2 ft. thick of concrete off-sets at each layer. Arches turned between foundation piers. Under tower two rows of 12 in. by 3 in. plankings in addition to above. Settlements equal. At Royal Insurance buildings piles were used with success. The Custom House, built on a continuous concrete foundation, settled unequally and badly.

The new part of Boston is built on made ground, it being originally covered with water. The Building Act, 1885, provides—"Piles driven for wall to rest upon shall not be less than 5 in. diameter "at the smallest end, not less than 3 ft. centres, nearer if required by inspector. Driven to solid "bearing ascertained by borings at the proprietor's expense. Walls not more than 20 ft. high may rest "on one row piles, over 20 ft. two rows, and more as shall be directed. To be cut off at grade as "determined by inspector, and capped with block granite levellers." The piles under Trinity Church, Boston, support two tons each approximately.

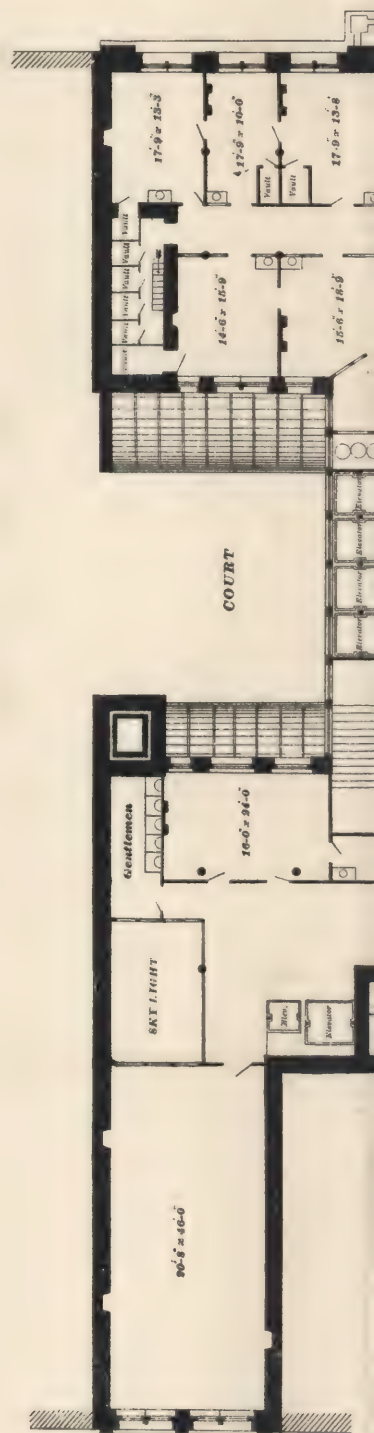
Other foundations on compressible soils. Piles 5 ft. to 6 ft. long placed near together and timber platform over, made of sufficient area that the pressure may be within safe limits for the soil. Sheet piling is also used. When the ground is of sufficient consistency to confine it, sand is used in layers and as piles. The layers are about 9 in. thick, well rammed and of good depth. Sand piling-holes are made in bottom of excavations, 6 in. to 8 in. diameter and 6 ft. to 7 ft. deep, filled with damp sand well rammed. The sand distributes the pressure both in a vertical and horizontal direction.

JOHN B. GASS.

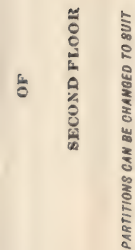




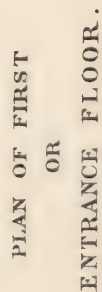
OFFICE BUILDINGS, CHICAGO.

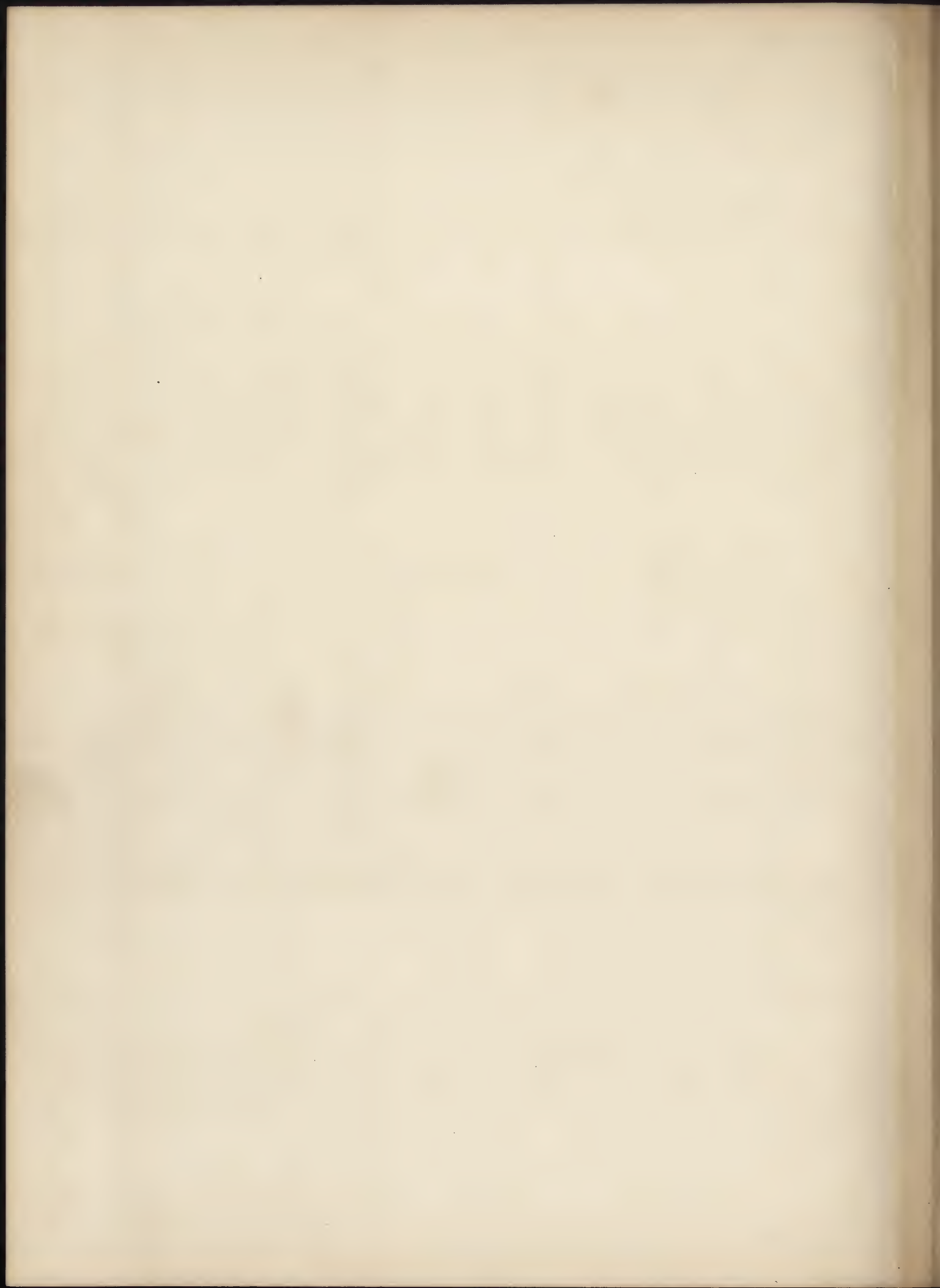


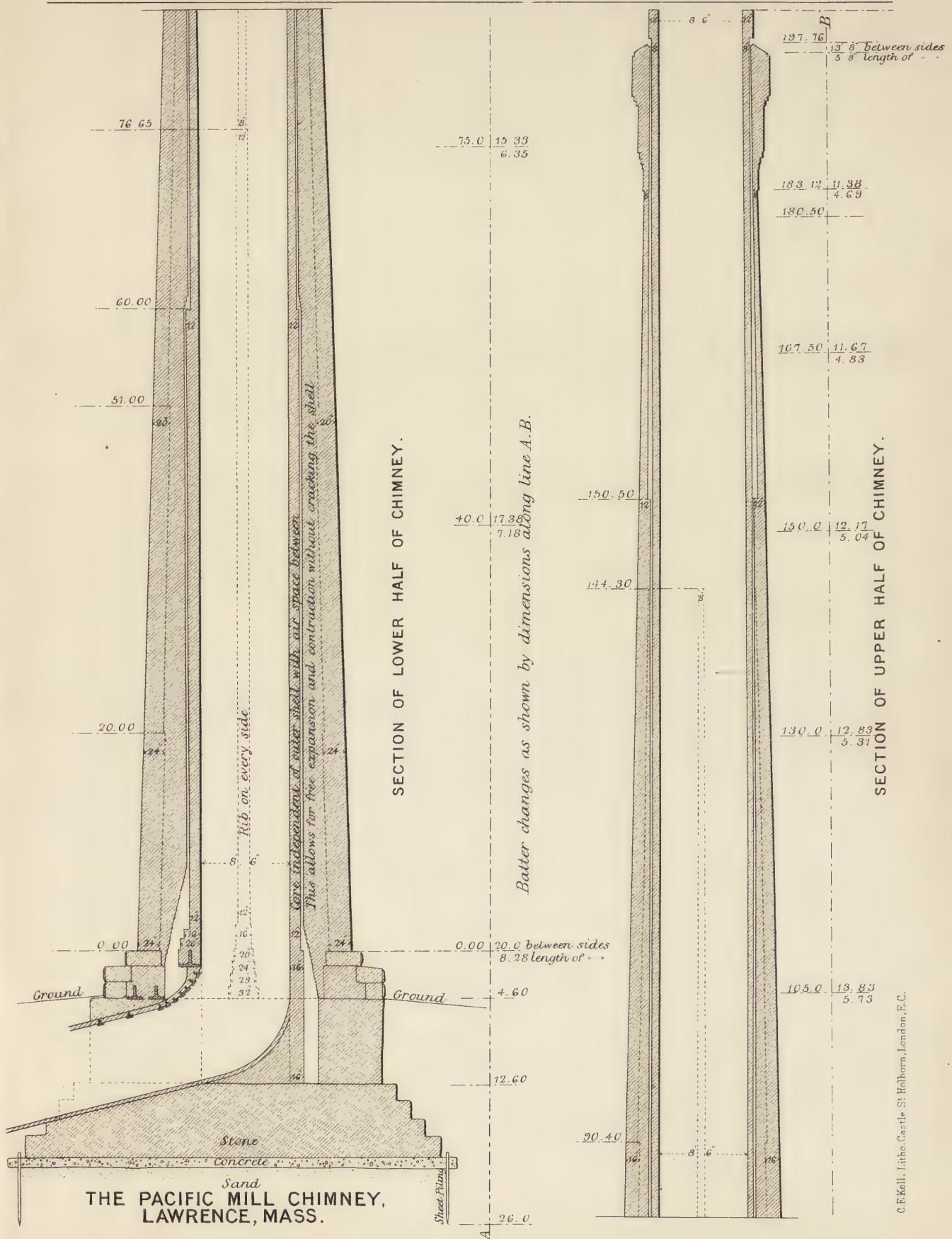
THE HOME INSURANCE



OFFICE BUILDINGS, CHICAGO.









XX.

REMAINS OF THE ROMAN OCCUPATION OF NORTH AFRICA,
WITH SPECIAL REFERENCE TO TUNISIA.²²By ALEXANDER GRAHAM, *Fellow*.[Read, Monday, 17th May 1886, A.W. Blomfield, M.A., F.S.A., *Vice-President*, in the Chair.]

FEW countries have undergone so many vicissitudes—at one period attaining a high degree of civilization, at another abandoned by its inhabitants or neglected by its rulers—and of which so little is known, as the Regency or Beylik of Tunis. Though somewhat less in area than England, but endowed by nature with a soil of unusual fertility, it has been the coveted and contested possession of nearly every power successively predominant on the shores of the Mediterranean; and its long record is crowded with stirring events. From the time when the first adventurers from the Syrian coast entered its shallow waters—a remote period, even before Saul was made king over Israel, and while Priam sat on the throne of Troy—down to the 7th century when the Arabs passed over it like a whirlwind, it has been the battlefield where the destinies of nations have been sealed, and where heroes and warriors have sought their last resting-place. The myths that surround its earlier development and shed a halo of romance over the progress of its primitive races are somewhat obscured by the sterner facts of later times—by wars innumerable, wars of invasion and local dissensions, succeeded by a long period of piracy and power misused, and finally by neglect, abandonment, and decay. Such is the history of Phœnician and Punic Carthage, of *Africa Provincia* of the Roman Empire, and of the Beylik of Tunis of more recent times. The legend of Dido still hangs over Carthage hill, the spirit of Hannibal haunts the plains of Zama, the banks of the Medjerda hold in memory the story of Regulus and his affrighted army. The air is full of myths and old-world stories which represent the traditions of the country through its varying fortunes; and slight though may be their connection with events in pre-historic times, yet, when written memorials fail, they serve as foundations for the historian and archæologist to build upon. The earlier records of the country are fragmentary, but we learn that the library of the Cartha-

²² See a Paper (IX) by the same author on the subject of the Roman occupation of North Africa, with special reference to *Algeria*, in the *TRANSACTIONS*, Vol. I. New Series, pp. 125-156.

genians was presented by the Romans to the kings of Numidia, and that Sallust, as proconsul of the province, borrowed largely from it in writing his history of the Jugurthine wars. In all probability Sallust was unacquainted with either the Libyan or the Phœnician tongues (the former being the language of the primitive inhabitants of the country), and moreover he must have felt little interest in a people who had been for so many centuries the enemies of Rome. Punic literature was probably limited, Greek being usually spoken by educated Carthaginians. Hannibal, we know, wrote in Greek. There is little doubt that the early records passed to Alexandria, which became the rival of Athens as a seat of learning. With the burning of its library by fanatical Arabs in the 7th century, many a link between the old world and the new was severed, and the only reliable information concerning the traditions and laws, the manners and customs of a people who were the fathers of navigation and the founders of commerce, was swept away.

Fortunately, our investigation of the Roman occupation of this portion of North Africa commences at a period when the information to be afforded by these earlier documents would be of a prefatory value. But in enquiries of this kind anything that leads up to the subject under consideration has a positive, if undefined, value, especially when, as in this instance, the arts and literature of one dominant race are about to be replaced or absorbed by those of another. There is little doubt that the Romans, whose powers of adaptation have been unequalled by any other nation, acquired new sciences and learnt improved methods of construction from the Carthaginians. But there is no evidence whatever that the architecture they brought with them was influenced by what they found in their new colony after the fall of Carthage. The close relations that existed so long between Carthage and Sicily gave the Carthaginians the benefits of Greek tastes and culture, and it is reasonable to infer that public buildings, the better class of houses, and the general embellishment of the capital and chief cities, was the work of Sicilians and not of natives. Numerous relics of Greek design have been found in the cemetery at *Utica* and elsewhere near the coast, showing either that the Greek population was large, or that the traffic between the two countries was considerable. But Winckelmann denies that the fine arts ever flourished at Carthage, and certainly every exploration, either on the site of the city itself or of the numerous *emporia* on the coast, favours this assertion. The monumental remains of the period of Roman occupation are as Roman as those of Rome herself—the same justness of proportion, the same details, the same harmony of parts. The cities and towns of Roman Africa were but miniature representatives of the Imperial metropolis.

The long interval between the destruction of the capital of the Carthaginians and the building of Roman Carthage is frequently lost sight of. After the fall of Punic Carthage a century elapsed before Julius Cæsar landed on the shores of Africa, and another century and a half passed before it became of sufficient importance to be recognised as the capital of the colony. A dearth of inscriptions of the time of the first emperors helps the supposition that the population was at first principally agricultural, and that when the landed proprietors and merchants had acquired wealth and

stability, its strength and that of the neighbouring municipalities began to develop, and so by degrees they became more and more assimilated in character to the Roman capital. With the advent of the Flavian line of emperors commenced the era of prosperity for the Province, and the favours showered on it by Trajan and Hadrian, and by their successors the Antonines [see Map, Illustn. xxxiii], is evidenced by the large number of monuments in their honour, both here and in the adjoining provinces. Again, when Septimius Severus, an African by birth, ascended the throne, a marked impetus was given to the construction of works of public usefulness and of embellishment.

A few words must suffice for the Carthage of the Romans. Built on the site of the older city, but occupying a smaller area, some idea of its magnificence can be obtained from the remains in marble and porphyry that still enrich the principal mosques and palaces in North Africa, which help to make Cordova one of the wonders of the western world, and to which the sumptuousness of the beauty of Pisa is chiefly due. El-Bekri, the Arab writer of the 11th century, says, "Marble at Carthage is so abundant that if all the inhabitants of Africa were to assemble to carry away the blocks they could not accomplish the task;" and speaking of the columns of the amphitheatre, he quaintly adds, "Two men could sit on one of the capitals cross-legged, with plenty of room for a table in the middle. The shafts are fluted, white as snow, and shining like crystal." And now of all this monumental grandeur not one stone remains on another. The fatal prediction of Scipio was fully verified after a lapse of nearly 600 years. "For her too," he said, as he watched the older city wrapped in flames, "I dread the vicissitudes of human affairs, and in her turn she may exhibit another flaming Carthage." Coming to modern times the explorations of M. Beulé and of the late Mr. Davis are too well known to require more than passing mention, and the admirable treatise, *Carthage and the Carthaginians*, by Mr. Boswell Smith, furnishes the student with every information on the condition of the country prior to the Roman occupation. It is satisfactory to know that, if the later Carthage with its wealth of marble and mosaic no longer exists, yet the paved streets of the Phœnician metropolis still await the spade of the explorer, some forty feet below the present surface. The few sculptures and mosaics deposited by Davis in the British Museum, represent only a small portion of the discoveries which have enriched many collections. Among the mosaics recovered by him is one of special interest, representing some dwelling houses in the city, several storeys high, indicating that under the Empire the city within the walls became so populated that houses had to be built to a considerable altitude. The mosaic, of which one-eighth portion has been mounted, represents a hunting-scene, the figures being about one half the size of life. In the left-hand corner is a house, or a series of houses, to which it is impossible to attach any scale. But, judging from the representation of the roofs, they could not be less than seven storeys high. A Christian symbol on the flank of one of the horses, makes the date of this mosaic not earlier than the 4th century. We know that in the reign of Trajan an edict was issued restricting the heights of private buildings in Rome to 60 Roman feet, but such regulations would scarcely apply to so remote a city as Carthage.

It is probable that the Romans, in rebuilding the city, followed the methods of their Punic predecessors and constructed their private buildings of considerable height. Strabo, who wrote at the commencement of the Christian era, estimated the population of Roman Carthage at 700,000 within the walls. What the population was in Punic times we have no means of knowing, but it was probably much in excess of this figure. Most writers are, however, agreed as to the circuit of the walls of the Punic metropolis, the estimates varying from 18 to 23 miles.

The piteous interest attached to the site of this old-world metropolis, whose citadel walls are now represented by a flimsy modern chapel, commemorative of St. Louis and his ill-starred expedition, is shared in an equal degree by a contemplation of the still fewer remains of its elder sister, the *Utica* of the Phœnicians. After the destruction of Carthage *Utica* became the metropolis of Roman Africa, and remained so for more than two centuries. The population in the time of Julius Cæsar was estimated at 40,000 within the walls. It was built on a promontory and was girt, like Carthage, with defensive walls of great solidity. It contained a large war-harbour with a palace for the admiral or governor in the centre (similar to the *Cothon* at Carthage and other coast towns), a citadel of great strength, a vast amphitheatre constructed in a hollow between two hills, a hippodrome, a theatre of large dimensions, numerous temples, and an immense arsenal. "The adjacent country," says Cæsar in his *Commentaries*, "is of great fertility. The trees supply quantities of timber. The fields are covered with corn, and there is water in abundance." "Its fortifications," says Hirtius, the friend of Cæsar, "are magnificent." Some of these walls remain. They are of solid rubble, but, the stones being small, have the appearance of concrete. As the lime was made from the same stone and is of the same colour, it is difficult to distinguish one from the other. Originally 20 ft. in thickness, their strength was such that not even the genius of Scipio or the gallantry of his soldiers could effect an entry into the city till after four years' protracted siege.

The study of Phœnician construction, or rather that phase of it which is undoubtedly Punic, scarcely comes within the province of this Paper. But the remains of *Utica*, as well as of other towns on the coast, present opportunities of comparing the Punic and Roman methods of buildings, in the use of stone and rubble, as well as the application of concrete, or of rammed earth commonly known as *pisé*. At *Utica* the distinction is very marked. The earliest walls, which are very massive, are entirely of rubble and without facing, the stone and the mortar, as before observed, being scarcely distinguishable. The vaulting of Punic times is of the same material. The inner surfaces of the walls appear to have been coated with thin lime, and from the absence of cut stones, the bold rounding of the angles, and the presence of rounded forms, it would appear that implements for the dressing and squaring of stone were unknown. The art of constructing arches by voussoirs, or of vaults on the same principle, were unknown to these Phœnician builders. The remains of the admiral's palace, which forms a conspicuous mass amongst the ruins of *Utica*, is a good example of this kind of building with rubble. At *Thapsus*, now known as Dimas, where Cæsar landed with his army,

the Punic sea-wall, nearly a quarter of a mile long, not quite destroyed, was built up in frames with small pebbles and mortar, like modern concrete construction. To use the words of Shaw, the traveller, "The walls were so well cemented and knit together, that "a solid rock cannot be more hard or durable." In walking over the ploughed fields and marshy lands of Bou-Chater, as *Utica* is now called, from which the sea has receded to a distance of six or seven miles, it is difficult to believe that some thirty or more feet under the surface lie the paved streets and foundations of one of the oldest known cities in the world. Although the plough literally turns up marble, it is the marble of the Roman city. Older *Utica* lies below. The investigations of the late M. Daux and of M. le Comte d'Hérissou, and their researches into the origin and development of Phœnician *emporion* in North Africa are fresh in the memory of many of us. A tribute of gratitude is certainly due to them for having, under great difficulties and with little information at their command, made a careful study of *Utica* and of the remains of other towns prior to the Roman occupation. Homeric Troy has been unearthed and Mycenæ has given up its treasures; and it is to be hoped that old *Utica*, which flourished 3000 years ago, may engage the attention of a future Schliemann, and that systematic exploration may throw much needed light on the history of an ancient people.

The Roman road that connected *Utica* with Carthage continued northward to *Hippo Zarytus* (or *Diarrhytus*, as it is sometimes written), called by the Arabs Benzerte, but known to us as Bizerta. There is not a single building here worth noting, the monuments of this important coast town, during the rule of the emperors, having been denuded by the Arabs or destroyed by them in the construction of their present uninteresting walled town. Although the past history of Bizerta is a blank, its future is one of interest, for it possesses an inland lake, comprising nearly 50 square miles of safe anchorage for war ships. The French have reason to be proud of having the finest natural harbour in the Mediterranean. Owing to neglect the short canal connecting it with the sea has been partly silted up, but a small outlay would clear the channel, and a continuance of the sand-drift from the north-west could be easily prevented.

On the northern coast we need not linger anywhere, except to remark that the Roman colony of *Thabraca*, or Tabarca, as it is generally called, possesses many scattered remains of a large and flourishing town. From the general appearance of the *frusta* of shafts and fragments of mouldings *Thabraca* must have been a commercial port, and devoid of any great public works. The interest of the place is now centred in a small rocky island, about one-third of a mile from the shore. At a height of nearly 400 ft. above the sea rises an immense ruined but disused citadel, having all the appearance of habitation, built by the Genoese during the celebrated expedition of Charles V against Tunis in 1535. The picturesqueness of this structure, a huge excrescence on the rock, is remarkable; and the white mass, as seen from the adjoining hills, framed in the blue of sky and sea, is very beautiful. By a recent decree of the Bey the stones on this island have been conceded to a mining company, some 12 miles distant, for the purposes of making a dock or harbour. It is to be hoped that this weird castle, perhaps the most picturesque object along the whole line of Tunisian coast, will be spared. The Roman

road south of *Thabraca* followed the banks of the *Tusca*, or Oued-el-Kebir, but better known as the Oued-es-Zan, the river of oak trees. This was the old western boundary of *Africa Provincia* on the side of Numidia, and till recently formed a strip of debateable land, the home of the wild Khomair tribe. The luxuriance of the foliage in this part of Tunisia can be better seen than described. Hill and dale clothed with perpetual verdure, forests of gigantic cork trees on whose mossy branches grow clusters of ferns in great variety, a thick undergrowth of myrtle and juniper and wild rose, a land without habitations, a landscape to gladden the idea of poet and painter,—such is the country of the Khomair tribe.²³ Traces of the Roman road and occupation are very apparent, but there are no indications of towns or villages, the country at that time, and even till very recently, being infested with panthers and other wild animals. On descending the southern slopes of the mountains, which separate the coast from the plains, and arriving on the great highway that led from Carthage to *Hippone*, the modern Bône, a long line of busy towns, now reduced to perfect ruin, comes into view. *Bulla Regia*, for instance, now called Chehia-Beni-Mazeu, for some centuries the residence of kings of Numidia, has not at the present day, as far as the site has been explored, one architectural monument standing. A few years ago a triumphal arch, having considerable ornamentation, was a conspicuous feature on the rising ground. An inexcusable concession of the stones of the district, for the purposes of the Tunisian railway recently completed, was followed by a destruction of such monuments as were standing, as well as of a number of inscribed stones near the surface, which might have thrown some light on the early history of this royal city. The *Thermae*, judging from the remains, were on a large scale, and covered a considerable area of land. The theatre, the walls of which are still intact, built of great blocks of finely dressed stone, was beautifully situated on a spur of the mountain. The ground at the present time rises to a level with the top of the wall of the *proscenium*. This will give some idea of the alteration of the surface since the final destruction and abandonment of *Bulla Regia* by the Arabs in the 7th century. The amphitheatre is only indicated by undulations of the ground, and the entire site of the city, nearly a mile long, is so choked with weeds and undergrowth that recognition of the different public buildings is difficult. In the centre of the city are the remains of a large *Nymphæum*, semi-circular in plan (a favourite form with the Romans). From the appearance of the fragments scattered about this was a work of great beauty, and was ornamented with colonnades, like other well-known examples. The railway engineers have wantonly reduced this monument to a mere ruin, and have even removed the leaden pipes used by the Romans for the distribution of water to various parts of the city. Still of *Bulla Regia* it may be said that it has to be unearthed. According to the late M. Tissot,²⁴ who made careful investigations here a few years ago, the city appears to have preserved its Punico-Libyan character, and coins

²³ "Umbriferos ubi pandit Tabraca saltus."—Juv. Sat. X, 194.—A. G.

²⁴ M. Charles Tissot, Ambassador to the Court of St. James's, Member of the Institut de France, died in Paris, 2nd July 1884. His valuable researches in North Africa deserve all praise. *Mauritania Tingitania*, and *Le Bassin du Bagrada et la Voie Romaine de Carthage à Hippone par Bulla Regia*, were published in the "Mémoires présentés . . . à l'Académie des Inscriptions et Belles Lettres." His

discovered here, bearing the crescent and the disc, indicate the worship of Baal joined to that of the great goddess of the Carthaginians, Tanith or Virgo Cælestis. The town of *Simittu*, or Chemtou, as it is now called, one day's journey westward, like *Bulla Regia*, awaits systematic exploration. It attained some celebrity under the Empire on account of the beauty of the marbles, which were worked here extensively and shipped to Rome. Hadrian, we know, valued these products very highly, as an inscription informs us, and employed them largely in the ornamentation of his villas at Tivoli and Antium. Indeed they appear to have been so highly prized that their use was disallowed in buildings here. Neither shafts nor columns of marble have been found at Chemtou, though an aqueduct still standing, and in fair preservation (owing to subsequent reconstruction), is built with waste rubble from the quarries, the piers being strengthened with bands of stone. The monumental remains of *Simittu* are in complete ruin. A colossal bridge over the Medjerda, the ancient *Bagradas*, restored by Trajan (as an immense slab of *giallo-antico* marble lying in a meadow close by informs us), is now a confused mass of stone and marble rubble, and enormous blocks of cut stone, forming the facing of the piers, strew the bed of the river in all directions. The quarries are once again, after an interval of twelve centuries, in full work, and it is to be hoped that these beautiful products, unequalled in Africa, may become better known in the English market.

The remains of numerous other towns on this great highway are subjects for historical and archæological rather than architectural study, and may be passed without comment. But we may direct our attention with considerable interest to that stately line of piers and arches crossing the Medjerda valley about 100 miles lower down, bringing the waters of Mount Zaghouan and Mount Djougar to the cities of Carthage and Tunis. I doubt whether there is any Roman building now standing within the vast area of the Empire, which bears in so high a degree the impress of imperial will, or attests so visibly the strength of Roman character as this so-called aqueduct of Carthage. We know that it was conceived by Hadrian and commenced after his first visit to Africa, A.D. 123, and there is reason to believe that this stupendous work was not finally completed till the reign of Septimius Severus, 70 years later. A coin, bearing his effigy, was struck in the mint of Carthage, having on the reverse a figure of Astarte as the tutelary genius of that city, seated on a lion in front of a spring of water issuing from a rock. That portion of the aqueduct, which extends from Zaghouan to Djougar, a distance of 20 miles, was probably the work of Severus, as commemorated on this coin. The greater part of its length is subterranean, but where it passes over the plains of the Oued Melian and the Oued Medjerda, it is carried on a series of arches rising 60 or 70 ft. above the ground, and in crossing the former river, as well as over other depressed surfaces, it had two tiers of arches, and a total height of more than 120 ft. "The waters flow to Carthage," says El-Bekri, "on ranges of arches, placed one above the other, reaching even to the clouds." The most gigantic portion of the aqueduct was that across the Oued Melian, and was in fair preservation about 40 years ago. But a new bridge over the river being necessary,

principal work, *Exploration Scientifique de la Tunisie, Géographie ancienne*, was in the press at the time of his death; the first volume is issued, the others are being prepared for publication.—A. G.

in consequence of the increasing traffic between Tunis and Zaghouan, the piers and superstructure were overthrown to provide materials for its foundation. The bridge might have been constructed a few hundred yards higher up, and this noble monument left intact. It need scarcely be stated that the wooden bridge exhibits the usual combination of iron and stone, and has nothing in extenuation to recommend it.

The great aqueduct, we are told, was a work of necessity. A cry of distress from Carthage had reached Rome. For five years previously no rain had fallen in that part of North Africa. The cisterns were empty, the land was dried up, the harvest was failing, and the grain-ships for Rome were lying empty in the harbour. That there was corn enough to satisfy the wants of the Roman colony, peopled as it was, is not improbable. But Rome, as well as the chief towns in Italy, had for years past drawn great and increasing corn supplies from Africa, and, as the long wars under Trajan had withdrawn a large able-bodied population from agricultural pursuits, the question of supply from other countries became a subject of anxious consideration. We need not therefore be surprised at Hadrian's desire for a continuance of good harvests in his African colony. The system of rain-water supply, which the Carthaginians had brought to perfection, was continued by the Romans in rebuilding Carthage. The great reservoirs, which El-Bekri calls "the cisterns of the demons," were restored for the service of the aqueduct, and another range of reservoirs, called the smaller cisterns, of which there were 18, each measuring 93 ft. by 19 ft. 8 in., and 27 ft. 6 in. to the crown of the vault, capable of holding upwards of four millions of gallons, were built for the storage of rain-water. They are constructed with rubble and remarkably hard mortar, with a thin coating of cement, apparently made with marble dust, and in fair preservation. Some of these cisterns are still used by the peasantry. The larger cisterns, above mentioned, are in ruins. The first Roman cisterns in Africa were arranged after the Carthaginian manner, consisting of several long parallel basins with very thick rubble walls, and vaulted with rubble. According to Daux and other investigators, there were covered galleries over to assist in keeping the water fresh, and to protect from the sun the inhabitants who came to draw water. In the plains the cisterns were frequently of polygonal form, having the appearance of a great tank, built of rubble and strengthened by semicircular counterforts within and without. Those of a large size were not covered. In some cases another basin was added of rectangular shape, vaulted over, but having a flat roof, with openings at intervals to enable the inhabitants to let down their pitchers into the water. A range of cisterns of this form is seen on the road between Sousa and Kairouan. There is another, mentioned and illustrated by Daux, between Sousa and Ad Aquæ, the drawing of which has been reproduced in the translation of MM. Perrot and Chipiez's work, the *History of Art in Phœnicia and its Dependencies*, vol. i, p. 379. These authors ascribe both parts of these reservoirs to the ancient civilization, the two circular basins to the Carthaginians, the square filter to their conquerors.

The most remarkable reservoir [Illustn. xxxiv.] in North Africa is situated outside the walls of Kairouan. Here are two huge basins of polygonal shape, the larger being 414 ft. diameter, and 20 ft. deep, and having in the centre the substructure of a pavilion.

Around the smaller basin is a series of niches. Communicating with the larger are two parallel basins or filters, formerly covered by galleries or arcades. The walls of the great basin are of rubble, in alternate courses of 10 ins. and 4 ins., and strengthened on both sides by counterforts, symmetrically placed at intervals, semicircular on plan and at the top, like a niche reversed. The inner face is coated with thin cement. This extraordinary work is attributed by the Arabs, on the sole authority of El-Bekri, to the dynasty of the Aghlabites, who ruled over North Africa at the commencement of the 9th century. In all probability these reservoirs were only restored by the Arab rulers at that period.

The total length of the aqueduct of Carthage has been estimated at 61 miles. The actual duct, or channel, is about 3 ft. wide, and 6 ft. high, arched over, with openings at intervals for inspection and ventilation. The springs from the two mountains at Zaghuan and Djougar were, and are still, I believe, capable of supplying 81 gallons per second, or upwards of eight millions of gallons in 24 hours. The construction varies in different portions. That which was first commenced, nearest to Zaghuan, in the plains of the Oued-Melian, is beautifully built with courses of finely cut stone, each course being 20 in. high. The sizes of the piers average 12 ft. wide, and 15 ft. thick, and the spans of the arches average 15 ft. A roll moulding 20 in. thick forms the impost. The voussoirs are carefully cut, and the actual duct above these is formed entirely with rubble. The most interesting portion of the aqueduct, as a building construction, is that across the Medjerda plain, within 10 miles of Tunis [Illustrn. xxxv.] It is built of what is known as *pisé*, being simply the clayey soil of the district, mixed with a certain portion of lime, and built up in sections, after the manner of modern concrete construction. This method of building is attributed to the Phœnicians. Hannibal, during his long sojourn in Spain, constructed his fortifications thus in clay. Pliny speaks of it with rapture on account of its durability, and the ease with which it can be built, giving the name of *formacei* to walls of this kind, as made in a *forma*, or frame.²⁵ It may be that the Carthaginians found this mode of building prevalent among the earlier inhabitants of North Africa, and transmitted it to their successors. The piers in this portion of the aqueduct [Illustrn. xxxvi.] are 13 ft. wide, and nearly 15 ft. thick, the spans of the arches being 15 ft. The foundations consist of several courses of cut stone, and the superstructure is built up in sections 3 ft. 8 in. high. On the upper surface of each section channels, 6 in. square and 2 ft. 3 in. long, are left by the insertion of a mould [Illustrn. xxxvi, 2 & 3]. There were five such channels on the face, and three generally in the thickness. In these were placed strips of olive wood, 1 inch or more thick, and 6 in. wide. When the material was well consolidated and dry strong mortar, 2½ in. thick, containing a large admixture of wood ashes, was laid over the entire surface, filling up the channels. Wooden pegs were driven in at intervals in order to ascertain and secure a perfectly level bed for the next section, and so on up to the top,

²⁵ "Quid? Non et in Africa Hispaniaque ex terra parietes, quos appellant formaceos, quoniam in "forma circumdatis utrimque duabus tabulis inferciuntur verius, quam instruuntur, ævis durant, "incorrupti imbibis, ventis, ignibus, omnique cæmento firmiores? spectat etiam nunc speculas "Hannibalis Hispania; terrenasque turres jugis montium impositas."—*Pliny, Nat. Hist.*, xxxv. 47.—A.G.

60 or more feet from the ground. There is a course of stone at the springing, and the voussoirs are 2 ft. on the face, but of two or more stones in depth.

The stability of this mode of construction is apparent by the excellent condition of the portions of the aqueduct now standing after repeated earthquakes. In some parts the Arabs, with their usual destructiveness, have removed more than half the stones forming the bases of these gigantic piers, and in others whole piers have fallen, or been thrown down, leaving the duct poised in mid-air without apparent support [Illustn. xxxvi. 1].

In the article "Pisé," in Rees's *Encyclopædia*, it is stated that the walls of most of the large houses on the banks of the Rhine were built of nothing but earth. At the angles at the bottom of the moulds, a rough board, 5 or 6 ft. long, something less than 1 in. thick, and in breadth 8, 9, or 10 in. was laid, so that in a wall 18 in. thick, there remains on each side 4 or 5 in. of earth. By this means the bond is entirely concealed in the body of the wall, neither air nor damp can reach it and of course there is no danger of decay. This has often been proved by experience, as, in taking down old houses constructed of *pisé*, such boards have always been found perfectly sound, and many that had not even lost the colour of new wood. It is easy to conceive how much these boards, from the pressure of the work above them, would contribute to bind together the courses at the angles. But this is not all. It is useful (particularly when the earth is not of very good quality) to put ends of planks into the *pisé*, after it has been rammed about half the height of the mould. They should be laid crosswise at the angles, at a distance of 2 ft. from one another, and thus serve to equalize the pressure of the upper parts on the lower courses of the *pisé*. By these means, an innumerable quantity of holders or bindings will be formed, which sometimes draw to the right and sometimes to the left of the angles. The rich traders of Lyons had no other way of building country houses.

The entire aqueduct of Carthage, as the work of the infidel, would have been destroyed by the Arabs centuries ago, if some Eastern story-teller had not woven a legend in its favour, and attributed its construction to a true follower of the prophet. The story says that under the Carthaginian rule, a neighbouring king, who was a good Mohammedan, fell in love with the daughter of a Carthaginian senator, and demanded her in marriage. Consent was given on condition that he brought the waters of Zaghouan and Djougar to Carthage. The work was long and tedious, and at the moment of completion the girl died. A younger sister stepped forward to take her place. The work was finished, and the marriage was celebrated.

The principal Roman road connecting Carthage with the towns on the eastern coast skirted the Sebhka-es-Sedjoumi, a salt lake south of Tunis, and followed the sea-shore to the extreme south of the Regency. Nearly every town noted in the Itinerary of Antonine has been identified, and during the last few years the discovery of numerous inscriptions has helped to clear up many doubts, and to settle controversies as to sites and Roman names. But alterations of surface during many centuries, changes in the coast line, the formation of marsh lands, owing to long neglect of the courses of rivers and of mountain streams, have rendered identification difficult. Between Carthage and *Hadrumentum*, the modern Sousa, a distance of about 80 miles, was once a continuous line of towns and

villages, mostly situated on rising ground near the seashore. Among these *Aphrodisium*, nearly a mile across, must have been conspicuous. Beautifully placed on several low hills, and surrounded by olive woods and gardens in high cultivation, it attracted the attention of the Vandal kings and remained a royal residence till the armies of Belisarius cleared the land of this scourge of North Africa. *Aphrodisium* is now a confused mass of stone and rubble. The palace is marked by an enclosure, and constructed with huge blocks; the triumphal arches, with the exception of one, which has no special features, are overthrown; the temple, supposed to have been dedicated to Aphrodite, is scarcely traceable; weeds choke the stream that ran merrily through the town; the surrounding woods and gardens have disappeared, and miles of swamp and reeds hide the line of the seashore. Not far from here, and on the outskirts of another ruined town, is a large circular tomb, or mausoleum on a square base, bearing a resemblance to that of Cæcilia Metella, or of the Plautia family near Tivoli, but of smaller dimensions than either of these. Its diameter is about 48 ft., and its present height about 34 ft. It was faced with large blocks of cut stone in courses 20 in. high, and had a cornice, and probably an attic. Shaw speaks of three inscriptions on votive tablets to be seen on the facework, but these have entirely disappeared, as well as nearly every block of facing stone which the Arabs could remove with their miserable implements. The monument is called by them Kasr-el-Menara, signifying a lighthouse. Many towns, of which there are remains, lying further from the coast, although now inaccessible after heavy rains, were doubtless served by roads in Roman times. *Uthina*, for instance, north-east of Zaghuan, and now known as Oudena, was a Roman city of great extent, covering several hills, and commanding one of the finest panoramic views in all Tunisia. At the present day it has no means of direct approach. The remains are interesting as an archæological study, but, with the exception of a portion of an aqueduct and several immense cisterns and enclosures, are so ruined as to preclude any idea of the original appearance of the city. Gigantic blocks of masonry and masses of rubble cover the surface for more than a mile, but not a single inscription has yet been unearthed to throw any light on the origin or development of *Uthina*. The theatre and the baths, the ruined basilica and the arcades of the amphitheatre, have long since been overthrown and despoiled, and become for the most part the home of the jackal, or a rough shelter for some dozen of Bedouin families.

The town of Zaghuan, situated on the northern slopes of the mountain of that name, and two days' journey S.S.W. from Carthage, is built on the site and with the materials of a Roman town. Its name resembles so closely *Zeugitania*, the title by which *Africa Provincia* was known at the time of the Roman invasion, that it is reasonable to suppose they were once synonymous. Shaw, the traveller, says that the boundary of *Zeugitania* was at the foot of the mountain now called Zaghuan, and adds that the Zygantes mentioned by Herodotus were the presumed inhabitants of this country. The waters of Zaghuan are not only renowned for their purity, but for certain properties useful in dyeing. This is the only place in the Regency where the dyeing of the red caps worn in the Mohammedan countries, here called *chachias*, in Egypt *tarboosh*, and in Turkey *fez*, is carried on. A short distance from the town is situated the great source of water

supply to Carthage, and with the supplementary source from Djougar, about 20 miles farther south, the city of Tunis and the intervening country is still supplied, but through a more prosaic channel than the stately duct that once led to Roman Carthage. Here, under a spur of the mountain, is the remarkable ruin of a small temple, placed in the centre of the arc of a semicircular colonnade, the entire composition resembling a Roman theatre as seen from the *proscenium*, or more strictly recalling, on a much smaller scale, the portico of St. Peter's at Rome, and its colonnades. The width of the colonnade is 15 ft., its back wall is constructed with finely cut blocks of stone, its columns are of the Corinthian order, its roof was vaulted, and in the back wall opposite each alternate intercolumniation was a niche for a statue. The total number of intercolumniations was 24, twelve on each side the central temple. The entire area in front, 94 ft. wide, and 86 ft. long, was paved with large flat stones. The spring flowed under this area, the water passing into a basin of the form of a double horse-shoe, to which there was access by a flight of steps at either end. Here commenced the conduits which served to irrigate the adjacent lands and the great aqueduct besides. This structure, designed with much care, has beauty of its own apart from the felicity of its position. The few ornate fragments that remain (those of the entablature being the best preserved) would amply suffice for a restoration on paper of this interesting monument. The shafts and their carved capitals have all been removed. They will be found, as usual, in the nearest mosques, misapplied, splashed over with whitewash, and wedged up to support the flimsy Arab roofs.

Southward, after passing Mount Djougar, where there was a somewhat similar temple erected over a spring, but now entirely ruined, the road soon again reaches the plains which extend throughout the interior of Tunisia. Somewhere near the centre of this treeless, uninteresting country, stands the holy city of Kairouan, the Mecca or chief seat of Mohammedan fanaticism in North Africa, the last resting place of tens of thousands of the faithful. In Kairouan, there is little appertaining to Roman archæology, and the town is remarkable as being the only one of any size in the Regency which belongs solely to the period of Arab occupation. It is generally stated that from the nearest Roman town, *Vicus Augusti*, the site of which has been identified with Sabra, were removed the magnificent shafts of marble and porphyry, with their white marble capitals, which form the chief ornament of the Great Mosque in Kairouan. This, I am of opinion, is an error. The use by the Romans of marble as a building material in North Africa, appears to have been mostly confined to the towns on or near the coast. The principal quarries were near the coast, and transport from port to port was easy. Fragments of shafts, or slabs of marble are rarely met with in the interior. There was abundance of good stone, some of the limestone being almost equal to marble in texture and appearance. Such an insignificant town as *Vicus Augusti*, of which we have no record by any historian, was probably constructed entirely with stone of the locality, for the most part in the form of rubble. The walls of Kairouan and the buildings generally are of brick. Had any Roman town adjacent to Kairouan furnished plenty of cut stone, the holy city would have shown in its edifices a preponderance of that material. The marbles in the Great Mosque, both in the prayer chamber and the court, were much more probably the

chief spoil of Roman towns near the coast. The absence of marble shafts in the city of Tunis, only 12 miles from Carthage, helps the supposition that the temples of Roman Carthage also supplied a large portion of these beautiful embellishments of the Arab city. The favour shown by the Romans to what is known as the Composite order which, towards the fall of the Empire, showed great elasticity in its treatment, and considerable departure from so early an example as that in the Arch of Titus at Rome, is apparent on examination of the capitals in the Great Mosque. Among them are also numerous capitals of the best type of Corinthian; these may have been the work of Sicilian Greeks, who were largely employed, as before remarked, in buildings at Carthage. Some few capitals are Byzantine, which must have been the spoil of other countries, for the occupation of North Africa by Justinian and his successors was a short one, and was one long series of wars and feuds with the Desert tribes. The majority of capitals are Composite. Similar methods produced at Cordova similar results, though on a far grander scale. To beautify its mosque Roman *Hispania* was compelled to give up marble treasures of basilica and temple for the glorification of the new creed.

South of Kairouan are no Roman remains worth noting, until, at a distance of 42 miles, is reached the site of the ancient *Thysdrus*, better known as El-Djem. To search for monuments in any of the numerous coast towns, such as Sousa, Sfax, or Mahedia, or Gabès, important though they may be commercially at the present day, would be attended with much labour, and probably with ill-success. Wherever the Arab has permanently located himself, either in great walled towns like Sousa or Sfax, or in a small hamlet of ill-constructed hovels, invariably built on the site of some older town, he has used the Roman stones as the props and mainstays of his dwelling. It matters little whether it is cap or base, or tombstone, or fragment of entablature. A corner stone is wanted, or a door lintel must be found, and as he has no appliances for quarrying or dressing stones (even assuming he were not too indolent to provide them) he takes the first Roman block that comes to hand, and fits his mud wall against it. A peep into the court of a mosque (entry being forbidden throughout the Regency except in Kairouan) reveals the misuse of many a slab and fluted shaft, and a glimpse at an Arab dwelling shows the same misapplication of materials over which the Roman builders obtained so thorough a mastery.

The name of *Thysdrus* sounds unfamiliar in connection with El-Djem and the great amphitheatre there known by that title. Indeed, were it not for the presence of this gigantic structure the site of the Roman town would have been difficult to identify, and the absence of records or complete inscriptions renders the history of the amphitheatre²⁶ more or less matter of conjecture. As to the town itself, however, we know, from the writings of Hirtius, that Julius Cæsar levied a fine on its inhabitants after the battle of *Thapsus*, a coast town 20 miles distant, where the issue proved fatal to the party of Scipio. *Thysdrus* cannot be said to exist at the present day, but the site is clearly indicated by the disturbed surface of the ground near the amphitheatre, and by the discovery in recent years of a number of tombstones. It could not have been a town of any size or importance, for Hirtius tells us that Cæsar mitigated the fine on account of

²⁶ Views of this amphitheatre are given in *Illustns.* xxxvii, xxxviii.

the wretched condition of the inhabitants, *propter humilitatem civitatis certo numero frumenti multat*. It was here, nearly three centuries later, that Gordian the Elder, pro-consul of Africa, and at that time 80 years of age, was drawn from a peaceful life to raise the standard of revolt against Maximinus the tyrant. And it was here, in this little town, A.D. 238, that Gordian was proclaimed emperor, sharing the purple with his son, Gordian the Younger. Within a month the latter was slain in battle against Maximinus, and the father, worn out by age and misfortune, put an end to his own life at Carthage, after a reign of only six weeks. Gordian III, the last of the dynasty, was but a youth when he ascended the throne, and his career was cut short after a reign of six years.

It may have been during this brief Gordian era that the amphitheatre of *Thysdrus* was planned and commenced—a thank-offering by Gordian I to the inhabitants of the little colony who had placed him in his old age on the throne of the Cæsars. According to the custom on such occasions payments out of the imperial treasury were decreed for so many weeks' festivities, and probably the cost of the amphitheatre, needful for a repeated exhibition of the games of the arena, was defrayed from the same source. But this is a matter of conjecture, and the whole subject is involved in mystery. Capitolinus, in his lives of the Gordians, written in the reigns of Diocletian and Constantine, and dedicated to the latter emperor, makes no mention of any such structure. He alludes to the proclamation at *Thysdrus* of the first Gordian as emperor, and tells us in a subsequent chapter that great festivities were in preparation by Gordian III for celebrating the 1000th anniversary of the foundation of Rome, commemorated a few years later by Philip, his successor. Surely the erection of so great an edifice and of so monumental a character, covering $4\frac{1}{2}$ acres of ground, at least 120 ft. in height, and capable of holding more than 30,000 persons, would not have been passed over without comment by so careful a biographer as Capitolinus. The origin of the statement, still unverified, may be attributed to the discovery of a coin or medal of Gordian the Elder, with an amphitheatre on the reverse. This coin has not been identified, as far as I am aware, by any medallist. Now there is another coin of the Gordian era, with a somewhat similar representation of an amphitheatre, which undoubtedly refers to the repairing or finishing of the Flavian amphitheatre at Rome.²⁷ In both coins the amphitheatre is represented as having three storeys of arcades, an attic, a colossus on one side and a portico on the other. In one case the head of the colossus has rays round it, symbolical of Apollo or the Sun, but in other respects is similar. It may be that one coin was struck at Rome and the other in the mint at Carthage, but they both refer to the same building, and the representation of the colossus is none other than the so-called Colossus of Nero. The comparative silence of Latin authors, and of Arab writers of the 11th and 12th centuries, such as El-Bekri and Edrisi, on any matter relating to *Thysdrus*, renders a solution of this question somewhat difficult. Justus Lipsius, the author of *Admiranda sive De Magnitudine Romana*, written in 1630, gives a list of all the known amphitheatres, but

²⁷ Drawings of these coins are given in *A Compleat History of the Ancient Amphitheatres*, by the Marquis Scipio Maffei, Lond., 1730.—A. G.

makes no mention of the one at *Thysdrus*. The Jesuit father, Josephe Guis, who wrote an elaborate account of Arles and of other amphitheatres, is quite silent on the point, and the Marquis Scipio Maffei, when comparing the amphitheatre at Verona with those at Rome and Capua, boldly asserts that these were the only amphitheatres ever built by the Romans. The rest, including those whose remains may be still seen at Arles, Nîmes, Pompeii, and Pola (not mentioning *Thysdrus*), he describes as theatres, and not intended for gladiatorial exhibitions. Shaw, who travelled through Barbary, was the first to draw attention to this great monument at *Thysdrus*, and Bruce was probably the first traveller who made a drawing of it. Gibbon, the historian, gives no clue as to its origin, and derives most of his information about this period of Roman history from the works of Capitolinus. Our own encyclopædias are also quite silent on this point, and some of them ignore the monument altogether. There is little doubt, however, that many inscribed stones, removed from the amphitheatre from time to time, are built into the walls of Arab huts in the adjacent village of El-Djem, and that a systematic exploration of the site of ancient *Thysdrus* would bring to light some record of the building of this gigantic structure. For the present we must be content with traditional history, and assume (there is reasonable ground for the assumption) that the building was planned and nearly completed under the Gordian dynasty. The coming celebration of the 10th centenary of the foundation of Rome, for which the Gordians were preparing, would promote the building of amphitheatres, and the completion of such as were in progress, not only in Rome but in every province of the Empire. Capitolinus tells us plainly that the preparations of Gordian III were on the most extensive scale, and we learn from the same reliable author that the Elder Gordian was a man of vast wealth, that his palace in Rome, during his consulship, was the one formerly occupied by Pompey the Great and afterwards by Marc Antony, that his villa on the Præneste Road, with its portico of 100 marble shafts, was noted for its extent and its sumptuousness, and that his munificence in encouraging the games of the arena was not surpassed by any one of the Roman emperors.

Like the aqueduct of Carthage, this monument at *Thysdrus* is a standing testimony to the force of Imperial will, and to the strength and determination so conspicuous in the Roman character. It mattered little to the Emperor whether stone or marble were at hand, or transport difficult. In the celebrated quarries at *Salleta*, twenty miles distant, stone was abundant, and so the stone from *Salleta* and no other was used. What were the appliances for conveying tens of thousands of huge blocks so long a journey, or how many thousands of forced labourers were employed on the work, we have no means of knowing. It is sufficient for us to regard with amazement the audacity of an undertaking which, in the present day and in the actual condition of the country, would be stamped with impossibility. Like all the other great amphitheatres of the Empire, the divisions and arrangements of the one at *Thysdrus* present no distinctive features, having externally the usual open arcades, each presenting a complete Order. In this one the first and third storeys are Corinthian, and the second Composite [Illustn. xxxix.]. Whether the attic was Corinthian or not, we have no means of judging, as only a portion of the inner

wall of the top storey remains. There were two principal entrances, one of which is entirely destroyed. The interior has suffered more than the exterior, owing to its having been used as a fortress, but principally due to the wantonness of the Arabs, who have for centuries been accustomed to regard it as a convenient stone quarry. When El-Bekri saw the amphitheatre, in the 11th century, he described the interior as being disposed in steps from top to bottom, and as late as Bruce's visit, some portions of the seats and inclines must have been intact. There is every reason to suppose the structure was never completed. The short rule of the three Gordians, scarcely extending over six years, with whose memory it was intimately associated, was followed by a line of emperors who had no interest in this obscure town in Africa, so far from the coast. This fact might help to account for so great a monument having been left unfinished. That it was built with great rapidity, there are many indications. Nearly every stone has a triangular-shaped lewis-hole on the external face, showing that the dragging and raising the blocks into position were of more consideration than the appearance of the work. Again, the voussoirs are not all carefully stepped on to the extrados of the arches, and several of the modillions which ornament the cornices of the three storeys are left uncut. There are indications of an intention to carve the keystones of the bottom arcade, but only two of these have been worked (perhaps by way of experiment), one representing the head of a lion and the other the bust of a female, the dressing of the head being in the fashion of the period. The three tiers of arcades appear to have been completed, with the exception perhaps of the top cornice, but there is no indication whatever of any of the facing blocks of the top storey having been fixed in position. There is one peculiarity about the structure which is very noticeable. Nearly every course is of the same height, being within a fraction of 20 in., the length of the stones averaging 38 in. In each Order the entablatures are similar, the architrave, frieze and cornice, each being one stone in height. The bases of the engaged columns are in one stone, and the surbases also. The superficial area of this amphitheatre is almost the same as that of the incomplete amphitheatre at Verona, which takes rank with that at Capua, as one of the largest of provincial edifices of this description [Illustn. xl.]. Comparing it with the Colosseum at Rome, there is a marked variation in the dimensions of repeated features, especially in the proportions of wall spaces and the open arches of the arcades. The extreme major axis may be estimated at 489 ft. and the minor axis at 403 ft. The height of the first Order is 26 ft. 6 in., of the second Order 32 ft. 10 in., and of the third Order 29 ft. 8 in. Assuming that the attic was intended to be of the same proportionate height as its prototype in Rome the total height of the external wall, measured from the ground, would have been 124 ft. 6 in. The construction itself possesses considerable merit. The stone, a shelly limestone, quite white when quarried, but after long exposure presenting a golden hue, is very beautiful when the sun is low on the horizon, but it did not admit of very fine workmanship. It has an excellent surface and looks as if it had been cut in blocks in the quarry. The vaulting throughout, which is in smaller blocks, presents for the most part excellent specimens of its own kind of construction, well worthy of study. The stones have not in all cases been well fitted, and consequently the mortar-joints, especially in the corridors,

are thicker than is generally found in the best class of Roman work. The proportions of the openings and wall-spaces are very pleasing, and the mouldings generally, though simple and frequently repeated, have been well considered. The history of the amphitheatre in later times has been a stirring one. Its shape and solidity made it useful as a fortress, and we learn that, at the time of the Arab invasion of North Africa, a female chieftain, named El-Kahina, resisted their approach, intrenching herself within the enclosure during a long siege. In 1697 the tribes of the district refused payment of the annual tribute to the Bey and sought refuge here. Artillery was brought to bear on the massive walls, and a breach equal to one-fourth of the perimeter prevented its ever being used again for a similar purpose. Since then the dislodged blocks have been carried off, and the breach made larger. The miserable dwellings of Arabs now clustered round the walls, and even within the lower arcades, present a striking and piteous contrast to the noble workmanship of their predecessors.

The whole subject of amphitheatres forms an important chapter in Roman history. They were a class of buildings essentially Roman, and are unknown in any country unsubdued by Roman arms. They may be divided into three classes. Those at Capua, El-Djem, Verona, Arles and Nîmes, all modelled after the Colosseum at Rome, may represent the first class. Those, of which we have examples at Pœstum, Pompeii, Caerleon, Bou-Chater, Oudena and numerous other towns in North Africa, partly excavated and partly embellished with masonry, may be assigned to the second class; and a long list of others, of which the one at Sandwich may be recognized as an example, being excavations of elliptical form with cut benches of turf, belong to the third class. These are rightly called *Castrensian* amphitheatres, and probably no Roman camp in any province, however remote, was unprovided with one of these rough constructions. Montfaucon says that every Roman city had its amphitheatre, and certainly in North Africa there is scarcely a single town where the lines of an amphitheatre cannot be traced.

Turning northward back to Carthage and following the other great highway that communicated with the interior of the country, skirting the southern bank of the river *Bagradas*, we come once again upon the remains of a long line of busy and flourishing towns. The sites have all been identified, owing to the discovery of numerous inscriptions, and in most cases have been replaced by Arab villages, bearing somewhat similar names to those in Roman times. But it is not till we arrive at *Thugga*, now known as Dougga, that any architectural monuments are found in sufficiently good preservation to be worth noting. The beauty of this spot on the slopes of an olive-clad hill, commanding a great extent of undulating fertile country, is very striking. What *Thugga* must have been in the days of its prosperity, when it covered an area of at least three square miles, is a matter of pleasant conjecture. Its temples, its arches, its great mausolea, its palaces, all built of a compact limestone, white as snow, and capable of being polished like marble, indicate the presence of a wealthy and cultured population. It is to be regretted that history is quite silent as to the origin and development of a town of such importance as *Thugga*, and of many others in North Africa whose remains excite curiosity. A tetra-

style prostyle temple, the portico of which is still standing, as well as the door of the *cella*, and a large portion of the back wall, is the most conspicuous of its monuments, and, when seen from the lower ground, stands out against the sky, a structure of great beauty [Illustn. xli]. It is of the Corinthian Order, and in general design, justness of proportion, and refinement of detail, will compare favourably with any similar work in Rome itself. It was built during the reign of Marcus Aurelius, and his colleague, L. Aurelius Verus, between the years 161 and 169, A.D., at the expense of two brothers of the family of Marcius, whose names are recorded elsewhere on a pedestal raised in their honour. It was dedicated to Jupiter and Minerva, as the inscription in the pediment, now nearly effaced, informs us. The shafts are fluted, and, with one exception, are monoliths. The height of the column, including its capital and base, is 33 ft., and of the entablature 8 ft. 10 in. The sculpture in the pediment is much worn, and, according to the late Sir Grenville Temple, represented the rape of Ganymede. There is certainly an eagle with outstretched wings, but the attitude of the figure is very indistinct. The moulded joints of the door of the *cella* are each in one stone, 27 ft. long, 2 ft. 4 in. wide, and 2 ft. 8 in. thick. The lintol, 22 ft. long, is in one stone. The construction of the walls was with cut stone and rubble, of the kind known as long and short bond, much used by the Romans, introduced by them into Britain, and frequently adopted by the Anglo-Saxons. The proportions of the Order in this temple are more in accordance with the rules of Vitruvius than is usually found in the Roman monuments of North Africa. In the Antonine periods we see indications of a departure from the sterner teaching of the Augustan era, and a glance at any measured drawings of buildings of the third and fourth centuries shows how the Roman architect, in preserving the proportions of the shaft and the capital, varied those of the parts of the entablature and attic, according to individual taste or caprice.

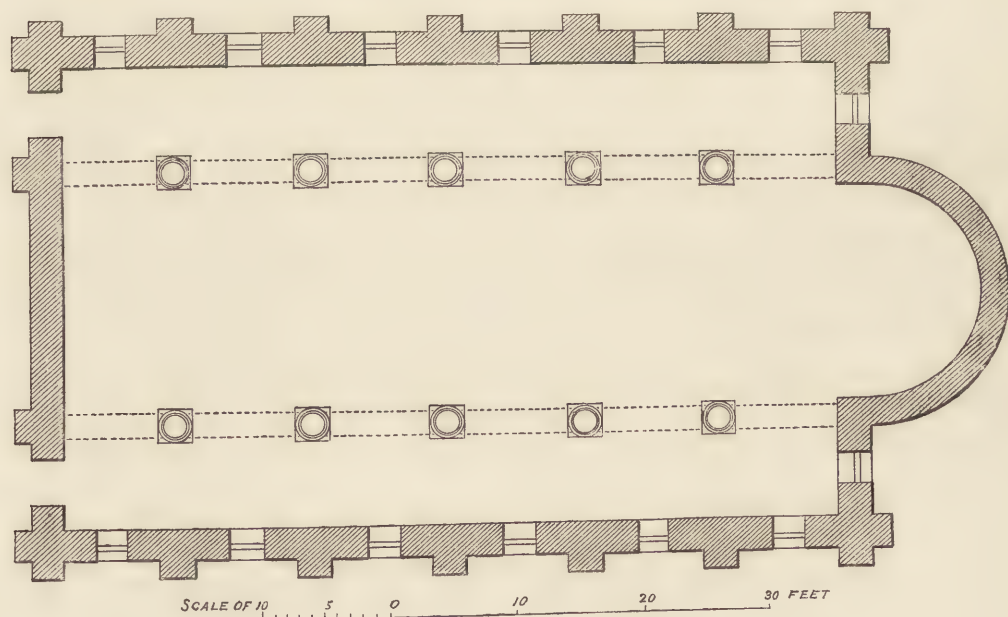
There are the remains of another temple that had a somewhat similar portico, a theatre, three triumphal arches, only one of which is not entirely overthrown, but without any distinctive features, two fountains (one of semi-circular form similar to the one at Zaghuan), and several cisterns, all constructed with parallel reservoirs, like those at Carthage and elsewhere. There is, however, one monument which, although belonging to a period antecedent to the Roman occupation, cannot be passed without notice. It is a mausoleum, commemorative of a distinguished Numidian, charmingly situated in the middle of an olive garden, and on the southern slope of the hill on which the principal part of *Thugga* was built. It is supposed to have been erected in the fourth century, B.C. The lower storey of the tomb, nearly a square of 22 ft., stands on a broad base of five steps. It has Ionic *antæ* at the angles, the volutes on each face terminating in two lotus-shaped leaves or flowers. The upper storey recedes from the face of the lower one, and stands on three steps. It is likewise of the Ionic Order, and had fluted engaged shafts on each face and at the angles, twelve altogether. The monument was crowned by a pyramid of graduated steps. Within the lower storey were four chambers, and within the upper one two chambers, stone doors with architraves round them giving access to the tombs from the north and east faces. It was built of large blocks of finely dressed

limestone, and with little mortar. Less than fifty years ago this remarkable tomb was in a fair state of preservation, and was only deficient in the crowning portion of the edifice. A sketch by Bruce, in 1765, and a drawing by Catherwood, in 1832, are, I believe, the only illustrations to rely upon. Both these are reproduced in Sir Lambert Playfair's *Travels in the Footsteps of Bruce*, and with many other monuments described in the same work formed the subject of a communication by the late Professor Donaldson recorded in the *TRANSACTIONS*.²⁸ At the present time the entire mausoleum is overthrown, with the exception of the lower storey. The steps forming the base are almost covered with earth and long grass. The story of its demolition which, I regret to say, has been fully confirmed, is well known to most of us. It appears that the late Sir Thomas Reade, Consul-General at Tunis, obtained permission, in 1847, from the Bey, over whom he had great influence, to remove from the lower part of the mausoleum two stones, bearing a remarkable bilingual inscription. It was the only known example of a dedication in the Libyan and Punic tongues, and was esteemed of great value. Instead of personally superintending the operation, the Consul seems to have ordered the removal of the stones, without instructing the workmen how it was to be done. The mausoleum is of solid construction, and, being built with great blocks of stone carefully set and bonded into the body of the structure, the removal of one or more facing blocks would have required unusual care. Any one who has had dealings with the natives of North Africa, or has watched an Arab workman engaged on building operations, with his clumsy tools and primitive appliances, would not expect much ingenuity to be exercised in a case like this. The workmen commenced at the summit, and dislodged and threw down every stone till they came to the two bearing the inscription. These were purchased by the British Government in 1852, at the sale of Reade's Collection, and removed to the British Museum. The prevailing characteristics of the monument are Greek, with the exception of the large *cavetto*, instead of the usual cornice mouldings, and the lotus-shaped leaves in the volutes of the lower Order. These certainly betray Egyptian and possibly other influences. In the great mausoleum in South Algeria, known as the Medrassen, to which reference has been made in treating of the Algerian section of this subject, the *cavetto* taking the place of the cornice mouldings is even more marked (for it is of a bolder character), and is allied with an Order of Greek Doric. A portion of a female statue was found close to the mausoleum at Dougga many years ago, but not sufficiently preserved to enable any one to assign a date to the monument, or to say on what part of the mausoleum it could have been placed. There are also two panels or portions of a frieze, the size of the stones being 5 ft. 8 in. by 3 ft. 2 in., and 2 ft. thick, both representing, in high relief, a *quadriga* and a charioteer. As they have been lying face upwards for many years the sculptures are almost effaced. Ruined though the monument is, I do not think there would be much difficulty in effecting a restoration on paper. Two of the fluted shafts and Ionic capitals are lying on the ground, as well as portions of the

²⁸ See "A Notice of the Recent Travels of H.M. Consul-General Lieut.-Col. Playfair in the provinces of Algiers and Tunis, &c.," by the late Professor Donaldson, in the *TRANSACTIONS*, 1876-77, pp. 33-43.

upper cornice, together with a large number of huge blocks as square and clean cut as of a new building. It is probable that many of the stones, forming the pyramidal termination of the structure, could be unearthed by the aid of pick and shovel.

Within two miles south of *Thugga*, the track crosses the site of *Agbia*, called by the Arabs Hedjah. Foundations of many Roman buildings are visible on all sides, but every principal monument appears to have been overthrown, as far back as the Byzantine invasion in the sixth century. An immense fortress, with square towers at the angles, constructed entirely with the stones of the Roman town, is a conspicuous object here, and is the only structure now standing. These fortresses, square or oblong on plan, and frequently with towers projecting beyond the face of the *enceinte*, are a marked feature in this country, and have a peculiar interest in their being the prototype of the mediæval castle. There is nothing in their design or arrangement resembling the earlier defences of the cities on the coasts of North Africa, in the time of the Phœnicians or their immediate successors. The fall of Sidon and its capture by the Philistines, through neglect of the simplest methods of defence, taught these cunning Phœnician traders a lesson they were not likely to forget in their African settlements, and led to the construction of these massive concrete and rubble walls, the remains of which are to be seen to the present day. In after times these defences were superseded by the stone-faced constructions of the Romans. These Roman fortresses again, with the exception of the citadel and walls of Carthage, were everywhere destroyed by the Vandals, so that, when the armies of



PLAN OF AN EARLY CHRISTIAN CHURCH, NEAR OUED GILMA.²⁹

²⁹ The external walls which are hatched, with portions of the windows, actually exist, and the position of the nave shafts, left white on plan, has been determined from the foundation piers.—A. G.

Justinian landed on the shores of Africa, this improvident race was left without defences, and the overthrow of the mixed hordes which constituted their army was the more speedily effected. The Byzantine generals, in their turn, not only reinstated the defences, but constructed fortresses and strong enclosures in nearly every Roman town in the interior, destroying the principal public buildings that had survived the destructive sway of the Vandals, and using up stone and marble indiscriminately in their works of defence. In some cases a temple and a *basilica* were spared, and converted into Christian churches, the symbols of a new creed, as seen to the present day, being conspicuously carved on the lintol or the door-posts.³⁰

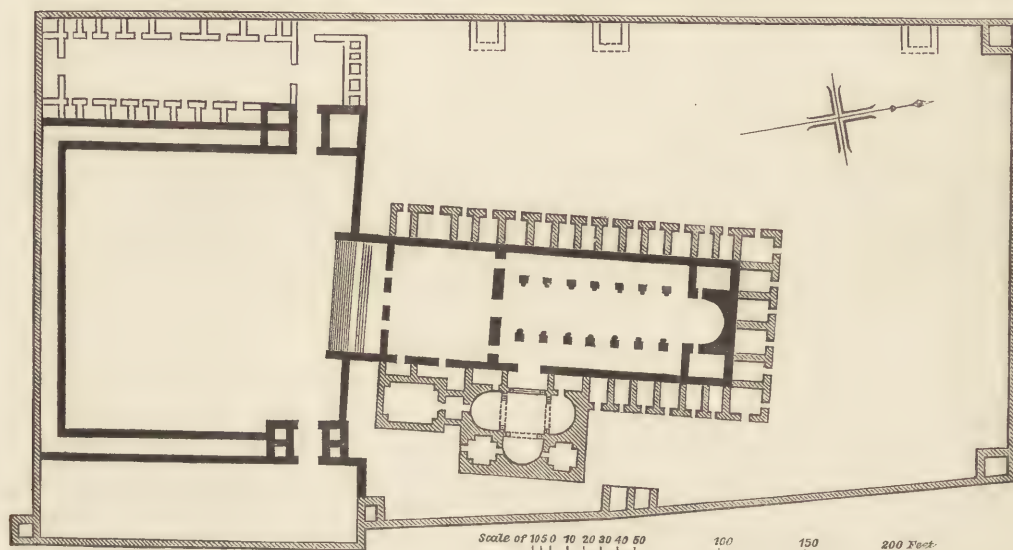
An account of the remains of the early Christian churches in North Africa, which was parcelled out into several hundred dioceses, would form a chapter by itself. It may suffice to state that most of these edifices were built with stones from some



Roman temple or other public building, and were of the basilica form. The foundations of the external walls of such churches may be traced on the site of nearly every town, and occasionally portions of the superstructure. An example may be seen amongst a mass of ruins [see woodcut on the previous page] near Oued Gilma, two days' journey west of Kairouan. Here are external buttresses of square form, small windows between the buttresses, and entrances at the west end to the north and south aisles. The walls are built with long and short bond, filled in with coursed rubble, and may be assigned to the fourth or fifth century. It was during the Byzantine occupation, lasting about a century, that the spirit of the Christian population, under the enthusiastic lead of the bishops, was roused to check the invasions of the Moors, and of the Desert tribes; and numerous buildings, answering the purpose of fortresses as well as convents, were erected outside the towns for shelter and protection. Within the enclosures, called *monasteria*, were ranges of cells for the soldier-monks, the originals of a class so celebrated in the Middle Ages, under such distinctive titles as Templars and Knights of St. John. About 15 miles south-east of Sousa is a coast town called Monastir, an Arab town that superseded the ancient *Ruspina*, celebrated in history as the basis of operations of Julius Cæsar in the African War. The town derives its modern name from one of these convent-fortresses, still existing, strangely enough, as a rest-house for saintly Mohammedans who relinquish the world for the Koran. The construction of these buildings differs but little from that which prevailed at a late period of the Empire, but in most instances the necessity of building with rapidity, in order to provide strongholds against the irruption of native tribes, compelled the use of any materials ready to hand. In this way a large number of inscriptions and fragments of sculpture may be still hidden in the stone walls. The enclosing walls of the town of Tebessa, and of the basilica there [see next page], with its enclosure and ranges of cells, to which attention has already been drawn in treating

³⁰ At the Council of Carthage, A.D. 411, there were 566 African bishops present, and at the African Council, A.D. 484, after the Vandal invasion, 475 sees sent representatives to King Hunneric.—A. G.

of the Algerian section of this subject, are the most perfect specimens of Byzantine work of the kind in North Africa. They were mostly built by Solomon, the successor of Belisarius as General of the African army, and were flanked by towers at intervals. One of the principal gates, flanked likewise by towers, is still called the Gate of Solomon.



BASILICA AT TEBESSA (ALGERIA) CONVERTED INTO A CHRISTIAN CHURCH.³¹

The principal Roman road from *Agbia* in a south-westerly direction leads to *Musti* and other adjacent towns, where there is nothing of interest worthy of special record. There are remains of several triumphal arches, one of which is still standing, and numerous tombs. So slightly does the Arab track deviate from the Roman highway, that, in following the former, distinct traces of the pavement of the latter are often met with. To the student in history this track has more than ordinary interest. It is close to the spot which Hannibal's evil genius selected for his final struggle with Rome, terminating the second Punic war, B.C. 202. The plain of Zama, that lies on the east side of the Djebel Mesaoood, has no visible trace of the royal city of Juba I bearing the same name, nor any slab or shaft to mark the site of one of the greatest, and perhaps one of the most decisive, battles of the world. A century later Cæcilius Metellus laid siege to Zama, but had to retire with great loss. "Zama" in the Phœnician tongue means "fountain of song," but, like Carthage, it must have had an ominous sound in Roman ears, seeing that its total destruction was decreed.

Another day's journey in the same direction brings the traveller to Zanfou, the ancient *Assuras*, a city that once covered a considerable area of ground. Either in consequence of earthquakes, of which there are many indications, or of abandonment,

³¹ In this diagram, the walls of the original *basilica*, assigned to the first century, are shown in black, and the Byzantine additions with hatched lines. The inclosure on the south side was the ancient Roman *Forum*.—A. G.

there is little here to detain us. A triumphal arch of the time of Septimius Severus, well proportioned, with one opening 18 ft. 6 in. wide, detached Corinthian fluted shafts and fragments of a cornice, showing great refinement of detail, forms a magnificent and picturesque ruin. There are two other arches, in less perfect condition, and the side walls of the *cella* of a temple with Corinthian pilasters, and a sculptured band very similar to the ornamentation in the back wall of the portico of the Pantheon at Rome, running between the pilasters at a height of about two-thirds of the wall. The portico is entirely destroyed. There are two *mausolea*, constructed with magnificent blocks of stone (but these have been overthrown in the hope of discovering treasures of some kind), and the remains of a theatre of massive construction. Two walled enclosures, built of great squared blocks, and a large number of tombstones testify to the presence of the Byzantines at a later period. The situation of *Assuras* on the banks of a precipitous ravine, which encircled it on three sides, was well chosen for defence. The Oued Zangour which flows at the bottom of the ravine, is unlike many other streams in North Africa, in that it is never dry. There were two bridges across the ravine; one, from the appearance of the remains, which are of excellent workmanship, favours the supposition that the river was much wider than at present, and not fordable.

From *Assuras* an upper road leads by way of Zouarin, where are some insignificant remains of a Roman town of that name, to *Sicca-Veneria*, better known by the title of El-Kef. A lower road went in a southerly direction to *Mactar*, continuing through a once thickly populated country till it reaches the Desert. El-Kef, signifying "the Rock," is perched so high on its rocky site, as to look like a city in the skies. Among its numerous remains there is scarcely anything left of a monumental character, but the extraordinary number of inscribed stones built into the walls of Arab houses, many of which are difficult of access, makes Kef a treasure-house of delight to the epigraphist. There is some doubt as to the origin of this town, but as it is frequently mentioned by ancient authors under the name of *Sicca-Veneria*, there is every probability it derived its title from the worship of Venus here. Valerius Maximus, who lived in the time of Tiberius, speaks of a celebrated temple at *Sicca*, where voluptuous rites in honour of Venus were of frequent occurrence. The city may have owed its foundation, and the significance of even its Roman name, to a Phœnician colony, who may have introduced the rites appertaining to the goddess adored both in Syria and Phœnicia, under the name of Succoth-Benoth. *Sicca* is mentioned by Sallust in his history of the Jugurthine war, and is found in the writings of Pliny. There is little doubt the Roman city covered a much larger area than the present Arab town. Blocks of masonry are to be seen on the east as well as on the west to some little distance, and the present Christian cemetery, which now occupies the site of a basilica transformed into a Christian church, is outside the existing walls. Of the particular temple, dedicated to Venus, there are no traces, nor is there a single inscription referring to it. The remains of a temple dedicated to Hercules, of large proportions, and highly ornamented, may be seen in a fragmentary condition, but the detail is coarse and is probably a work of the 4th century. Most of the public buildings appear to be of this period, the construction generally being such as is familiar to us in

the reign of Diocletian, consisting of immense stone lintols spanning the openings, and relieving arches with carefully cut voussoirs. The walls of a building of large proportions, which may have been a palace, or the public baths, is constructed in this way. A vaulted apse in connection with it is now the residence of an Arab, but it is so blackened by wood smoke, for which there is no other outlet than a low door, that the detail is indistinct. The cisterns, consisting of 13 parallel basins, each 92 ft. long, 23 ft. wide, and 20 ft. high to the crown of the vault, are in excellent preservation. No longer used for the storage of water, they have been converted into stables and exercising rooms for the French soldiers quartered outside the walls of the town. In connection with the great reservoirs, which were supplied from a spring in the rock, is a Roman fountain of monumental character, still in fair condition, and now the general cistern of the Arab town. Here the pure water, led by a duct from the rock, comes bubbling up at the rate of many thousand gallons a minute, the overflow passing down the precipitous streets to irrigate the rich soil of the plains. Outside the walls once stood a Christian *basilica* of some pretensions. The foundations of the external walls, a portion of the substructure of the apse, and fragments of the nave shafts of grey marble, constitute the sole remains. The misuse of Roman stones is remarkable in the small Jewish cemetery near the *basilica*; its tombstones are mostly tumulary stones from the Roman cemetery, their epitaphs, commencing as usual with the dedicatory letters D.M.S., are not effaced, the vertical memorials being laid flat on the ground, and the exposed parts thickly coated with whitewash.

The Roman road southward from *Assuras* led to *Mactar*, altered by the Arabs to

Mukther, a town of considerable extent, built on an elevated plateau between two streams, one of which is known as the Oued-Sabon, or Soap-River. The remains here are very numerous but, with the exception of one triumphal arch half-buried in the soil, and a mausoleum, are in too ruinous a condition to require more than passing mention [see diagram]. A second triumphal arch (in fair preservation at the time of Bruce's visit, and of a decorative character, but now little more than a mass of stones), two tombs of a monumental character, the few arches of an aqueduct, a temple, and the enclosing walls of several large public build-



ings, constitute the principal remains of a city which must have been in a flourishing condition at the commencement of the second century. The triumphal arch first mentioned has some features differing from those generally seen in such monuments [see previous page]. It has an Order within an Order. The effect is dignified, owing rather to the scale of the construction and the size of the mass than to any special merit in the design. Passing southward through *Tucca Terebintha*, now known as Dougga, the Roman road, which is somewhat difficult to trace, continued to *Sufes*, bearing the modern name of Sbiba, situated on several hills forming the spurs of a mountain range, and comprising an area of nearly three square miles. Here, as in many towns already referred to, the most conspicuous monument is a Byzantine citadel or walled enclosure, constructed entirely of the stones of the Roman city. A huge mass of rubble is all that remains of the great *Thermae*, and a large *Nymphæum* of semicircular form, decorated with columns and statues, is only represented by the stone blocks which formed the base of the superstructure. The whole site is strewn with blocks of cut stone, fragments of mouldings, and sculptured ornament. The records of *Sufes* are very scanty. It is mentioned in the Itinerary of Antonine as twenty-five miles from *Tucca Terebintha*, and an inscribed stone describes it as *splendissimus et felicissimus ordo Coloniae Sufetanae*, and under the protection of Hercules. In the Epistles of St. Augustine mention is made of the martyrdom of sixty inhabitants of the town for having thrown down a statue of that deity, an event still recorded in the Romish Calendar in the month of August. "We arrived at Sbiba," says El-Bekri, in the 11th century, "a town of great antiquity, built of stone, and "containing a college and several baths. The whole country around is covered with "gardens, and produces a saffron of the greatest excellence." Sbiba is now a wilderness. The soil is covered with rough herbage, the once flourishing city is now the home of the jackal, and human habitations are not to be found within a radius of thirty miles.

Two days' journey west of *Sufes*, but at present inaccessible from this town, are the remains of *Ammaedara*, better known by the abbreviated title, given by the Arabs, of *Haïdra*. When Bruce visited it, 120 years ago, the outline of the town could have been clearly traced, for he speaks of it as being about two miles in length and a quarter of a mile in breadth along a river-side wall, and watered with springs. None of the monuments are deserving of any special notice. A triumphal arch still standing, dedicated to Septimius Severus, A.D. 195, with detached Corinthian shafts, is not remarkable for excellence either of design or construction, neither are the monumental tombs, of several of which there are remains, conspicuous for any merit. The Byzantines established themselves in *Ammaedara* as a place of defence, and according to Procopius it was fortified by Justinian. The citadel he constructed is still standing, flanked by square towers and built with the largest blocks of stone from the Roman city. There are also the remains of no less than four Christian basilica, two of these being of considerable dimensions, with the nave and aisles separated by monolithic shafts. *Haïdra* is the nearest principal town to the frontier between Tunisia and Algeria, and is only one day's journey, or a distance of 25 miles from Tebessa, the ancient *Theveste*, of which a full description was given when treating of the Algerian section of this subject.

From *Theveste*, which for many centuries was one of the great centres of traffic, and whence a main road went direct westward to *Lambæsis* (the military centre of North Africa under the Roman Empire), the principal highway led in an easterly direction to *Scillium* or *Scillitana Colonia*, as it was named, according to an inscription on a triumphal arch, but now known as Kasrin. The greatest length of the town may be estimated at a mile and a-half, but there are no indications of its ever having been enclosed. It was beautifully placed on the verge of a high table-land, girt on three sides by the steep banks of a river. The site presents, as usual, a confused assemblage of stones and enclosures. A triumphal arch, of great constructive excellence, but unsatisfactory in general design and detail, stands conspicuously on the very edge of a precipitous ravine. No date can be assigned to this monument, which was probably erected towards the decline of the Empire. There are the remains of three *mausolea*, one only being in good preservation [Illustrn. xlii.]. This monument, three storeys in height, is built on a pyramid of steps now mostly covered by the ground. The lower storey, 12 ft. square, which is quite plain, has two entrances, 3 ft. square. The next storey, slightly receding from the lower one, has four Corinthian fluted pilasters, of great delicacy of workmanship, on each face (the two central ones on the principal side being spaced a little further apart in order to provide room for a lengthy inscription). The top storey consists at present of a large niche, square externally, and without any traces of ornamentation. The height of the mausoleum may be estimated at 50 ft. At the summit, whether immediately above the niche, or at a higher altitude, surmounting the crowning pyramid common to structures of this kind, was a bronze cock, and, as the quaint inscription below³² further informs us, it was placed "above the clouds and so near to heaven that, if nature had given it a voice, it would have compelled all the gods, by its morning song, to get up early." This monument was built by M. Flavius Secundus, in honour of his parents and other members of his family, who are fully described in one of the lengthy inscriptions nearly covering one entire face. In addition there are no less than 90 hexameters and 20 elegiacs, in which the charms of the city and the country round are set forth in a graphic manner by the local poet. What the charms of this country are now it would be difficult to discover. The land is bare and treeless, clumps of juniper bushes clothe the sides of the ravines, and the river that once ran freely round the town is now a comparatively small stream, bubbling over the rocks and soon lost in the plains, like so many of the rivers of North Africa. Pelissier, one of the most intelligent of recent travellers in this country, has remarked in his own language, with reference to the monuments of Kasrin, that if those "still standing in a country now desolate attest a former prosperity which confounds our imagination, these verses, composed in a remote town scarcely known in history, prove how the civilizing influence of Rome had awakened the intelligence and

³² The words of the inscription are—

"In summo tremulas galli non diximus alas
 Altior extrema qui puto nube volat
 Cujus si membris vocem natura dedisset
 Cogeret hic omnes surgere mane deos."—A. G.

"moral nature of a people once numerous and wealthy, but to-day without either art or literature, or even settled inhabitants. It may fairly be assumed that, at the time of the Antonines, the flourishing cities of Byzacene, of which *Scillium* was a remote town, were peopled with Romanized Africans, and supplied with schools capable of rivalling those of Italy."

Continuing along the Roman road eastward of *Scillium* one is perfectly astounded at the numerous remains of towns and villages, lying at short intervals on either side of the track. The walls of ordinary houses, both here and in other parts of the interior, were built either of rubble, or of the material before referred to, known as *pisé*. To add solidity to the structures the corners and other parts were secured by large blocks of cut stone, sometimes 10 or 12 ft. high, placed in the ground perpendicularly. In course of time the walling either crumbled or was washed away, leaving these blocks to stand for centuries, thus giving to large tracts of country the appearance of a vast cemetery. Some 23 miles east of *Scillium* is the ruined city of *Sufetula*, supposed by Bruce and others to have derived its name from the *Suffetes*, or senators of Carthaginian times. The modern name of the place, Sbeitla, is an Arab corruption. It is noted in the Itinerary of Antonine as 25 Roman miles south of *Sufes*, to which reference has already been made, and as enjoying great prosperity till the time of the Arab invasion. It was remarkable for the beauty of its aspect, its abundant supply of water, the sweetness of its climate, and the wealth of its inhabitants. It was entirely surrounded by gardens and orchards. Edrisi, the Arab geographer of the 12th century, and other writers, inform us that the Patrician Gregorius, as governor of Africa, selected *Sufetula* for his capital. Gregorius, it appears, had revolted from the Byzantine Empire, and, with the assistance of native tribes, had proclaimed himself ruler over a large territory, of which *Sufetula* was about the centre. With the appearance of the Arabs in this remote corner of North Africa commenced the struggle for supremacy between the representative of Christianity and the followers of Mahomet. Inequality of numbers rendered the strife a short one. The city, having no walls of defence, soon succumbed to the horde of invaders. Gregorius was slain, and the treasures of a wealthy population were seized by the conquering army. So great was the plunder, we are told, that every foot-soldier received 1000 *dinars*, and every horseman 3000 *dinars*, equal to more than £80 of our money. The records of *Sufetula* cease with this calamity, when one of the chief strongholds of the Christian creed was destroyed, and in which Christianity in Africa may be said to have received its final blow. The factious spirit of many of the bishops of the African Church, their numerous heresies, their sufferings at the time of the Vandal invasion and for a century afterwards, paved the way for the final overthrow of the Christian Church by the Arabs. And it is aptly remarked by Gibbon that "The northern coast of Africa is the only land in which the light of the Gospel, after a long and perfect establishment, has been totally extinguished. The arts, which had been taught by Carthage and Rome, were involved in the cloud of ignorance, and the doctrines of Cyprian and St. Augustine ceased to be studied. Five hundred episcopal churches were overturned by the hostile fury of the Donatists, the Vandals, and the Moors."

"The zeal and number of the clergy declined, and the people, without discipline or knowledge or hope, submissively sank under the yoke of the Arabian prophet."³³

To the architect the ruins of *Sufetula* are the most valuable of all the monumental remains yet discovered in Tunisia. From their extent and variety, and the fair condition of many of the buildings, they take rank with those at *Lambæsis* and *Thamugas* in Algeria, and offer to the student admirable examples of Roman architecture before its final decline [Illustn. xliii.]. The principal ruin consists of a rectangular walled enclosure 238 ft. long, and 198 ft. wide, of which a plan was given by the late Professor Donaldson, and published in the *TRANSACTIONS* for 1876-77. The drawing appears to have been hastily prepared from some notes and measurements furnished by Sir Lambert Playfair and other travellers, and it cannot be accepted as correct.

The whole enclosure is at present so encumbered with fallen masonry that measurements are not easily taken; moreover, a portion of the enclosure having evidently been rebuilt at a subsequent period, probably during the Byzantine occupation in the time of Gregorius, considerable study of the masonry is necessary to enable anyone to give a reliable opinion about the exact outline of the original walls, the height of the enclosure, and the general surroundings both within and without. Access is obtained by a monumental gateway on one side, and smaller openings on the three others. Facing the gateway and within the enclosure were three temples, side by side, the front and back walls of the *cellæ* being connected by open arches [Illustns. xliv.-xlvii.]. The back wall of the *cellæ* formed the back wall of the enclosure, and behind this ran one of the streets of the city. The central temple, which is of the composite order, has a *cella* 44 ft. long. The side temples, of the Corinthian Order, are somewhat smaller. The porticoes of the temples were all tetrastyle prostyle, the centre one being higher, but in other respects the detached shafts were symmetrically arranged. Taking the three porticos together, there were 18 shafts, the height of the shafts of the central order being 29 ft., and the others 25 ft. 3 in. They all stood on lofty stylobates constructed with huge blocks of stone. The side and back walls of the central structure were ornamented with engaged shafts projecting a full half diameter. The walls of the side structures were ornamented with pilasters. All the porticos are entirely overthrown. The broken shafts, which were all monoliths, the capitals, the fragments of cornices, and other enrichments lie piled up one on the other, and form a majestic and imposing mass. So much of it is buried far beneath the surface that it is impossible to say whether the pediments were ornamented with sculpture. The decorative character of the cornices and of other parts lying broken on the ground favours this supposition. The enclosure was paved with large slabs of stone, some of which are 7 ft. 6 in. long. Whether there were other temples against either of the side walls is a matter

³³ Victor Vitensis, the historian of the Vandal invasion of North Africa, informs us that during the persecution 4976 bishops, priests, deacons, and other clerics were taken to *Sicca Veneria* and *Lares*, and handed over to the Moors, who conducted them into the Desert (*sic*). In A.D. 484, the number of bishops deprived of their sees is computed to be—Zeugitania, 54; Numidia, 125; Byzacena, 115; Mauritania Cæsarensis, 126; Mauritania Sitifensis, 42; Tripolitana, 5: total, 467.—A. G.

of conjecture. There are *frusta* of shafts of varying diameter lying on the ground, but from the general confusion that reigns here it would be difficult to fix their exact positions. Indeed it would be necessary to excavate from 7 ft. to 10 ft. over a large portion of the area to enable one to form any definite conclusions. This could only be effected by mechanical appliances, as many of the blocks are of gigantic dimensions. The monumental gateway, before referred to, consists of a large central arch and two lateral ones [Illustn. xlviii.]. It has four engaged Corinthian shafts on the outer face, not fluted, but having a projecting surface that has all the appearance of having had what is termed a rusticated surface. Within the gateway was a portico communicating with a colonnade which continued round the enclosure till it abutted against the walls of the side temples. A range of shops stood against one of the side walls, but these were probably of a later erection than the original enclosure. The gateway, forming the grand entrance, is, strange to say, not in the axis of the central line of the middle temple, as shown on the plan³⁴ prepared by Donaldson, but is fully 20 ft. to one side of it. The reason of this is not apparent. The gateway was dedicated to Antoninus Pius, as recorded on an inscription in the frieze, and the temples were probably constructed about the same time. There are many points of resemblance in the details of all these monuments. The custom of enclosing temples within walls of defence may have originated at a time when a city's treasures were deposited within sacred edifices, and as a means of affording sanctuary and shelter for women and children, like the citadels of primitive times. Thus, the Temple of Æsculapius (the largest of those at Carthage) stood within the citadel, the Parthenon at Athens was within the walls of the Acropolis, and the Temple of Jupiter at Rome was in the Capitol. We have another example at Balbec, where the enclosure or so-called *hieron*, bears some resemblance, though on a larger scale, to the one at *Sufetula*.

The triumphal arch to the south of the city is more remarkable for its mass than for any features of special merit [Illustn. xlix.]. Apparently built at the close of the reign of Maximian, and the first of the reign of his successor, Constantine the Great, the inscription on the frieze records the dedication of the monument to both these emperors. A restoration of this triumphal arch [xlix.] and of the monumental gateway affording entrance to the *hieron* [xlviii.] is given in Illustn. 1. Numerous other buildings scattered over the site of *Sufetula* are in a more or less imperfect condition, and belong more to the province of the archæologist than of the architect. The remote position of this city has certainly been the best protector of its monuments, and there is little doubt that if there had been any habitations within 20 miles, and any means of transport over a country difficult of access, the few buildings still standing would long ago have been overthrown. It is satisfactory to state that the *Société des Monuments Historiques* has kept a watchful eye over these remarkable ruins. Two years ago a Company of Engineers was established here, under proper authority, to take note of the remains, to set up a series of stones, to mark the lines of the principal

³⁴ See the TRANSACTIONS, 1876-77, pp. 36, 37.

Rome, having developed and shaped to her own ends her neighbour's comparatively rude architecture, contemporary with her own political infancy, became possessed of an art properly her own. This she retained to the end. And although the buildings of Greece, of Egypt, and of Assyria, and even of Persia, became in their turn known to her; and although, for political reasons, as in Egypt, she sometimes encouraged the native methods, and sometimes, as at Tivoli, under Hadrian, she indulged in an archæological whim, neither inclination nor necessity led her to assimilate or adopt the foreign element—at the most accepting from the Greek the grace of a profile or the sumptuousness of a panel. Unswerving in purpose and true in aim, Rome admitted but one style for the varied requirements of public, private, or religious life; and that one, nationally representative, prevailed equally at home and abroad. By strength, unity, and consistency of character, rather than by force of arms, Rome subdued and retained the world; and, in these qualities, more than in her art-experiences or knowledge, which, indeed, were co-extensive with that of the civilized world, lay the secret of her success in architecture and building construction.

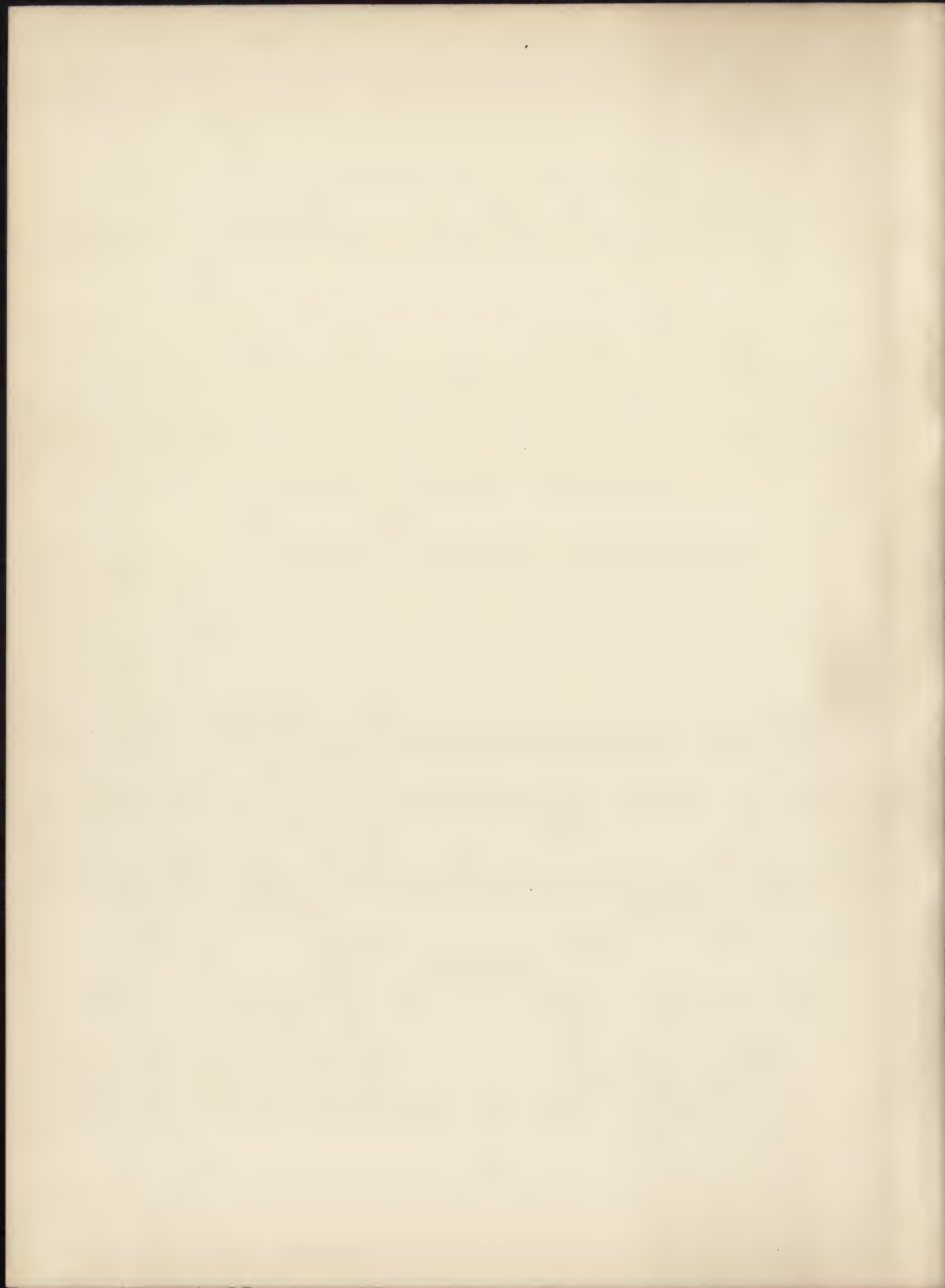
Reflections such as these, quickened by contact with the monuments themselves, and a sense of unnumbered obligations to the Romans in other fields than those of architecture, give an interest to research and to the study of their works, not only in North Africa, but in every province of the Roman Empire.

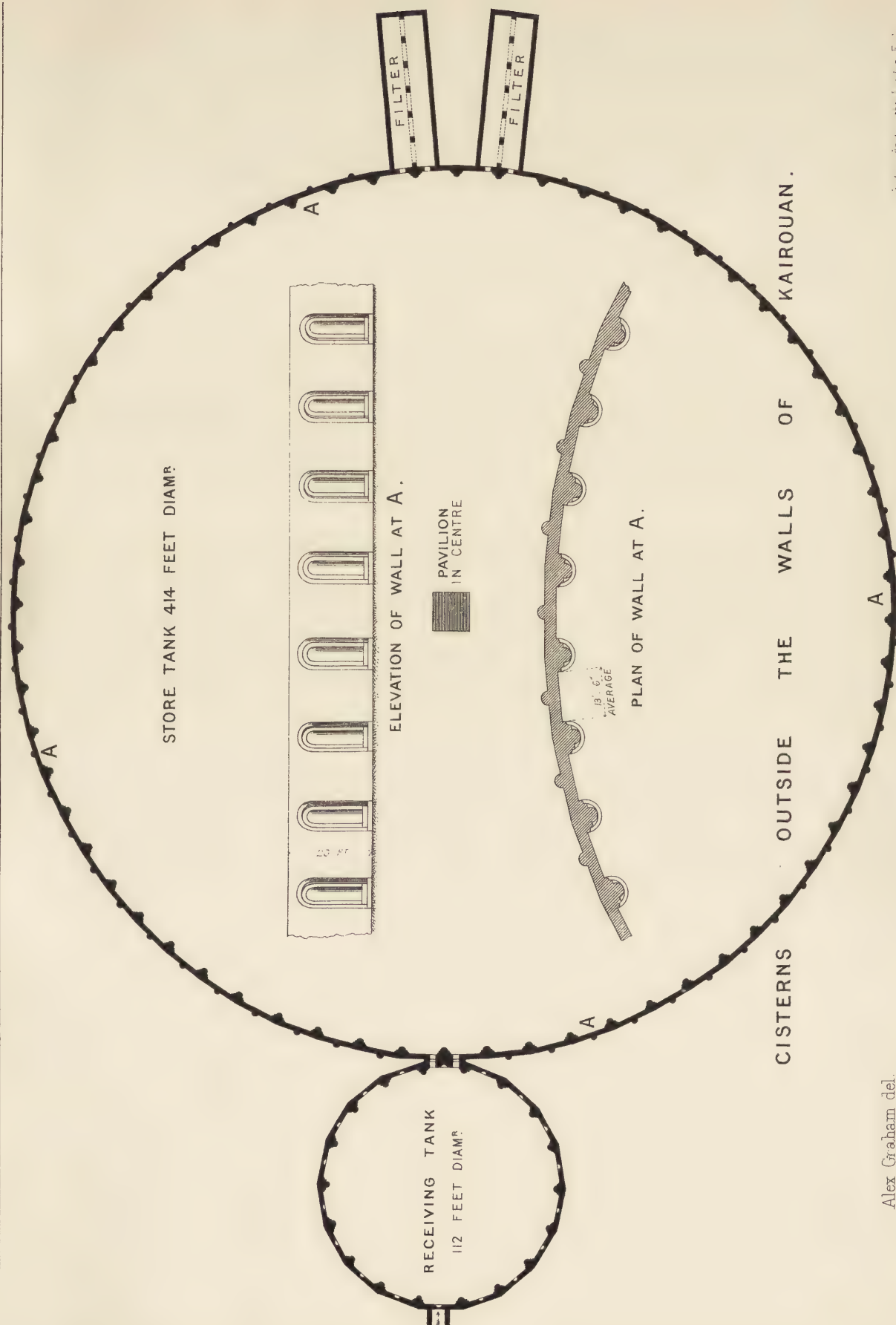
ALEX. GRAHAM.



Alex. Graham del.

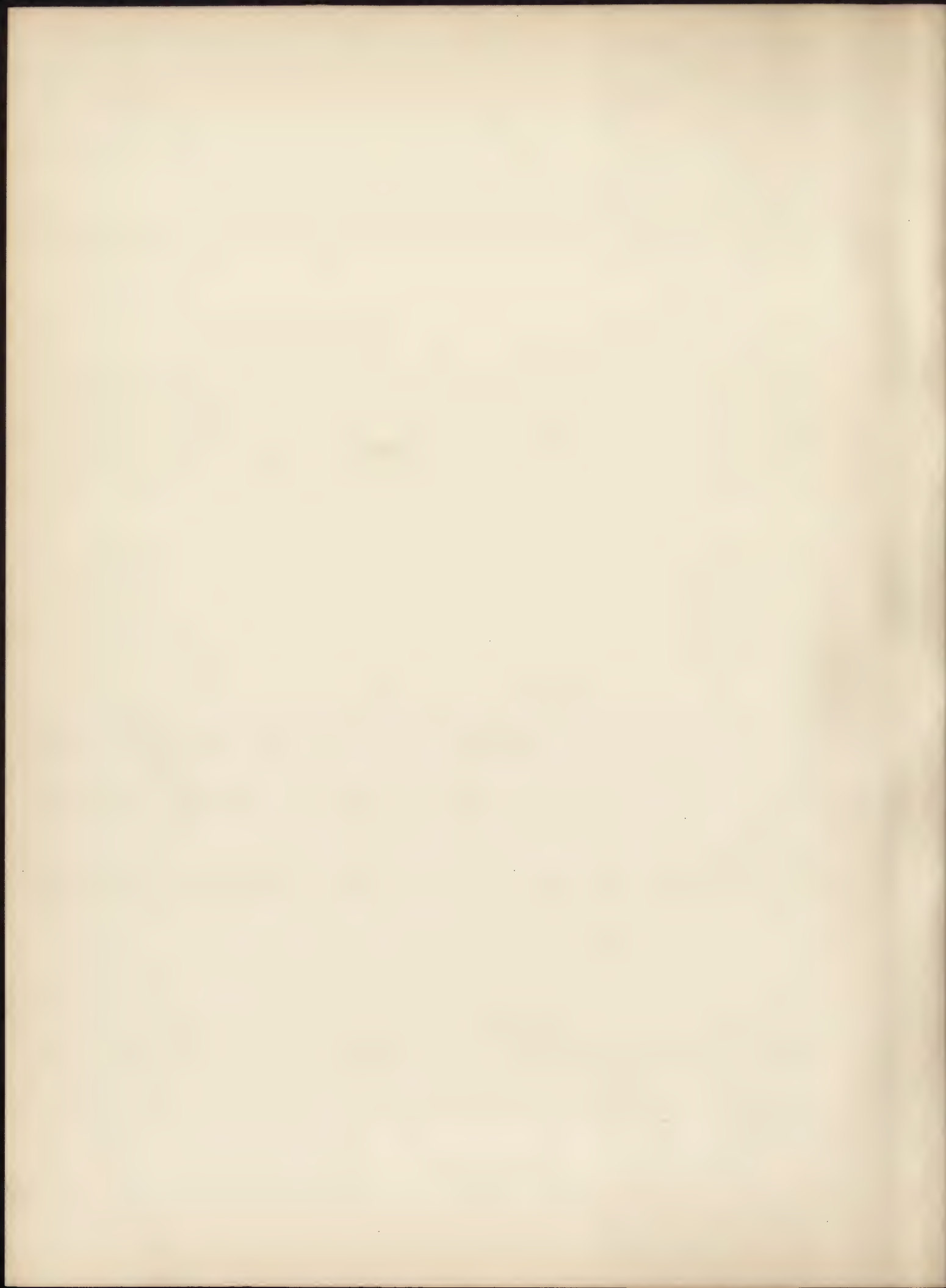
MAP OF TUNISIA IN THE AGE OF THE ANTONINES, A.D. 138 - 180.





Alex Graham del.

Engr. by J. H. P. & Co. London E.





THE PHOTOTYPE C5, 303, STRAND, LONDON.

REMAINS OF THE AQUEDUCT OF CARTHAGE.
[Reduced from a Sepia Drawing by Alex. Graham, Fellow.]



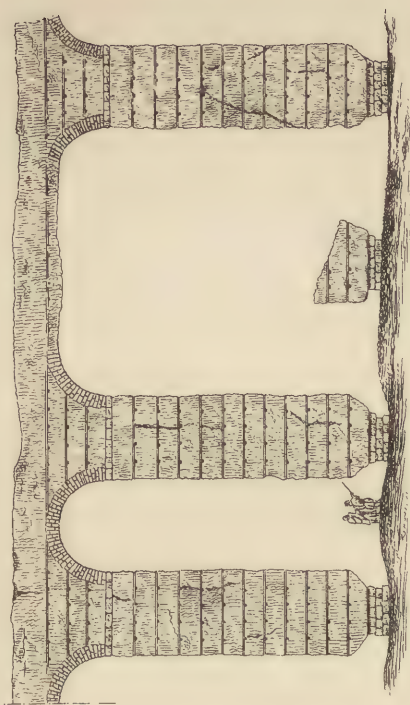
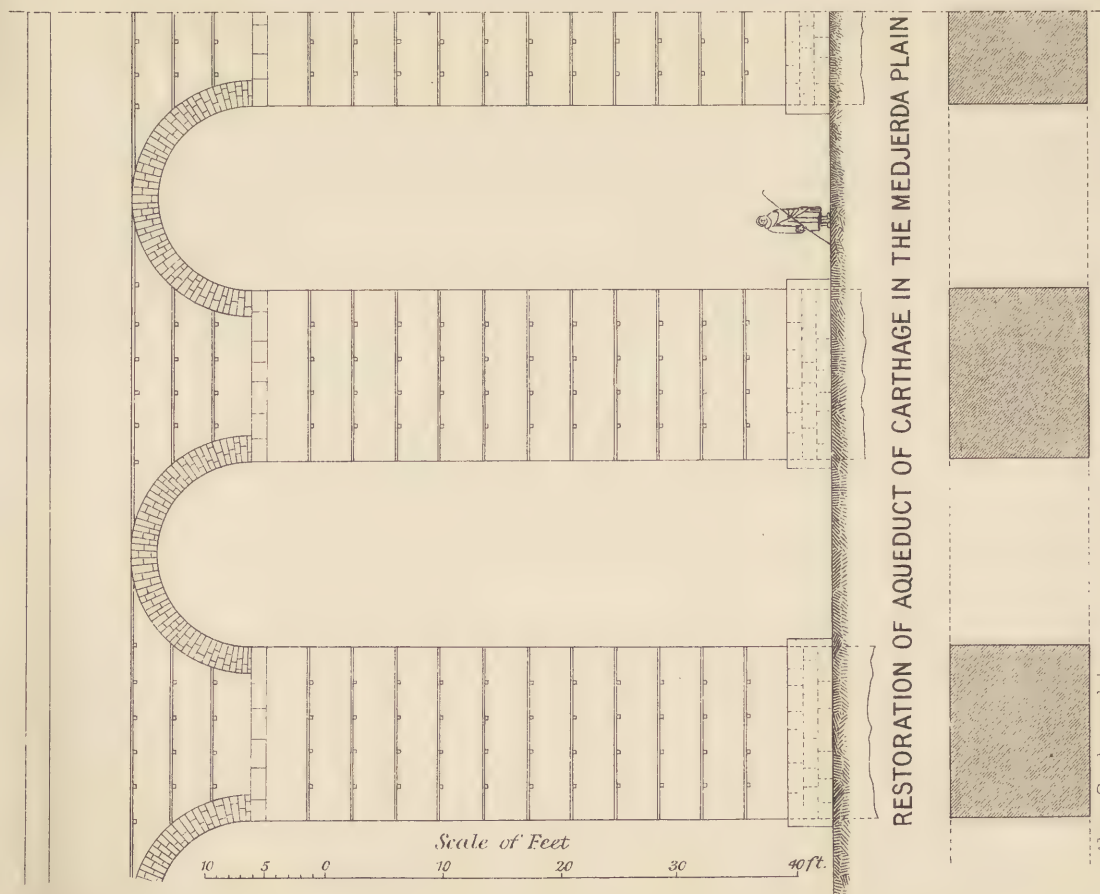


FIG. 1.

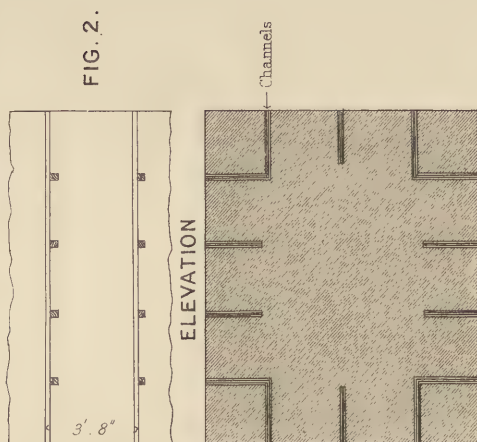
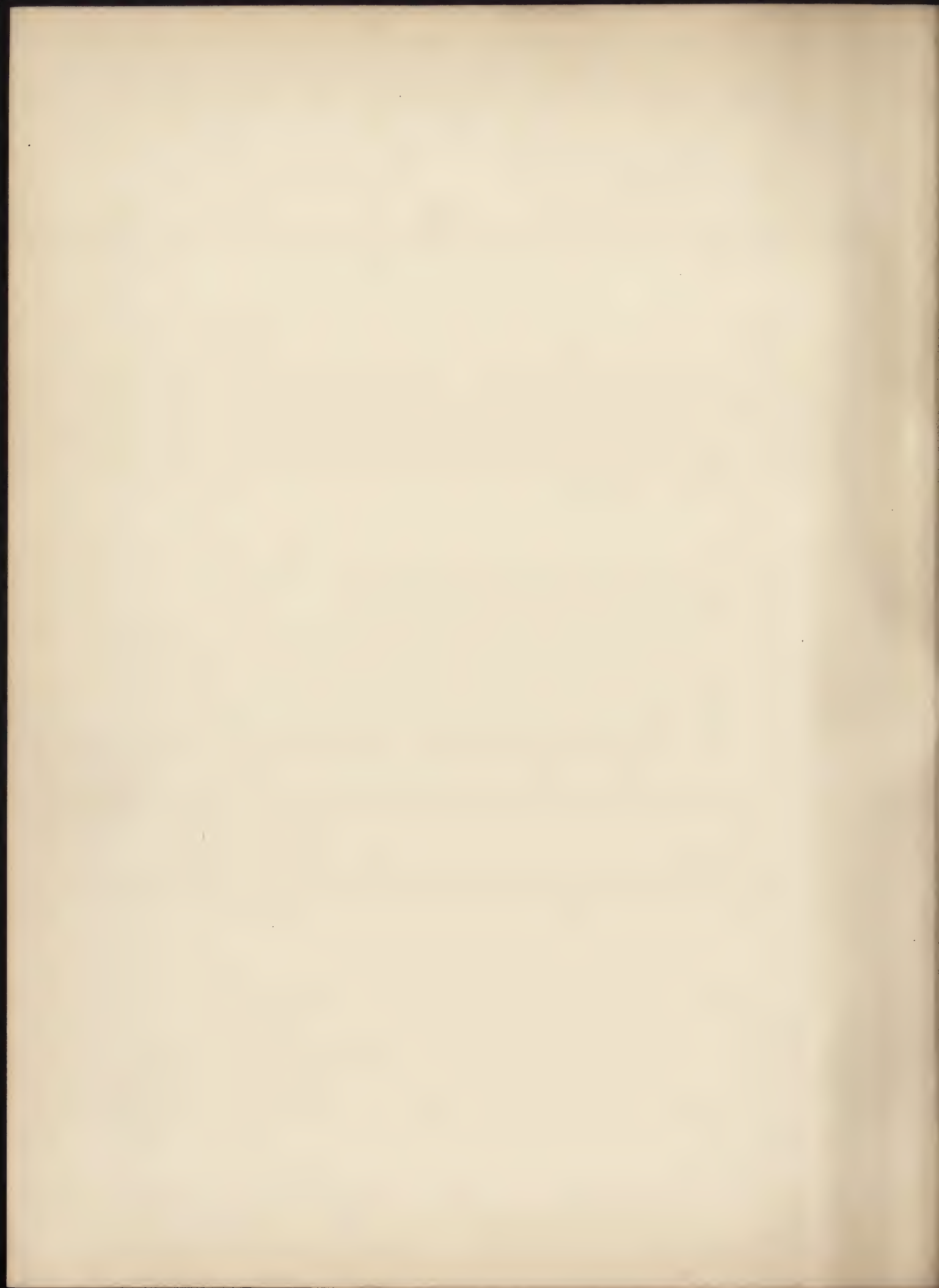


FIG. 3.
PLAN OF THE PIERS.







REMAINS OF THE AMPHITHEATRE
[Reduced from a Sepia]



THE PHOTOTYPE COMPANY, 303, STRAND, LONDON.

THEATRE AT EL-DJEM (THYSDRUS).
[Drawing by Alex. Graham, Fellow.]







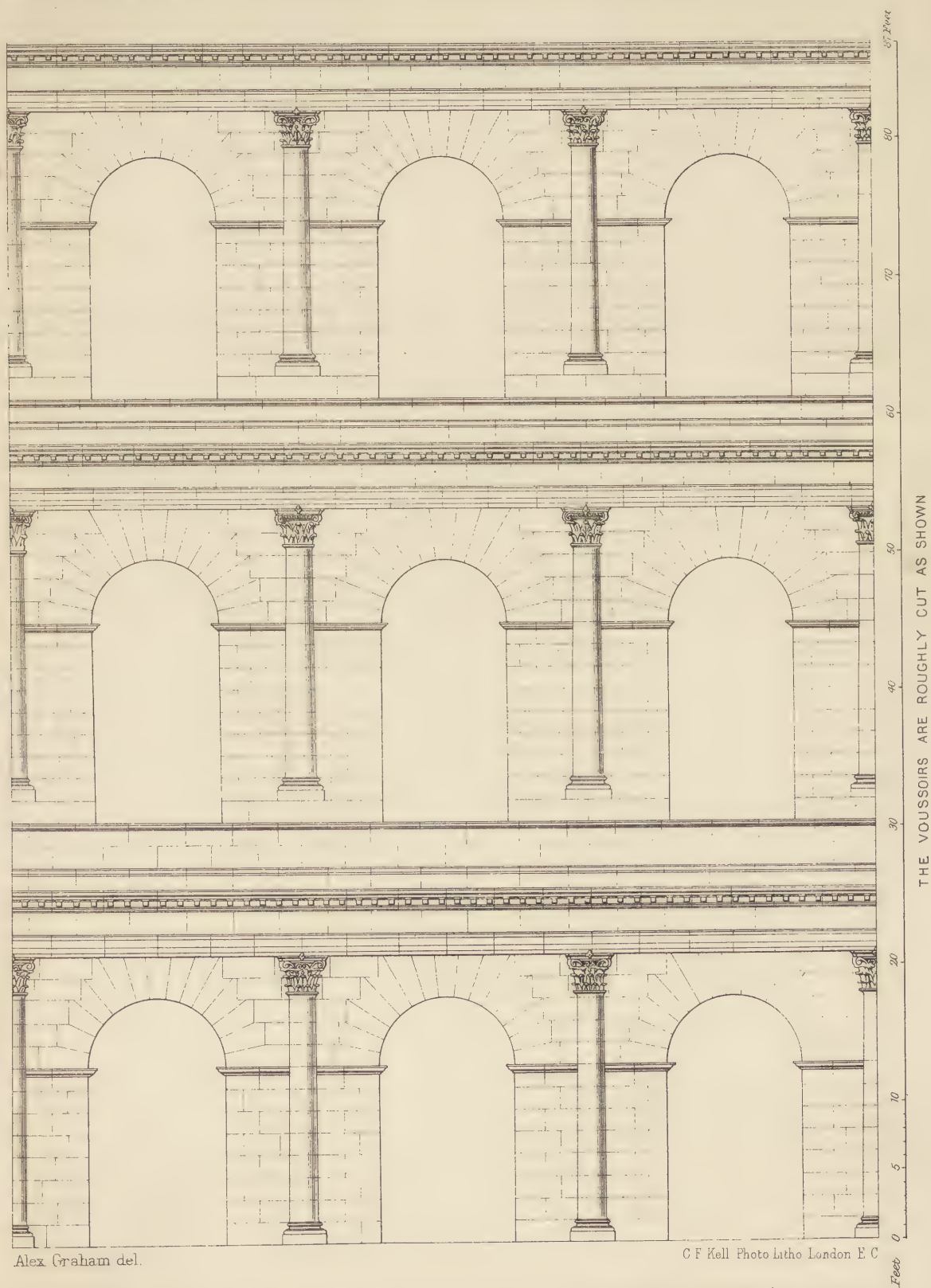
REMAINS OF THE AMPHITHEATRE
[Reduced from a Sepia Drawing]



THE PHOTOTYPE COMPANY, 303, STRAND, LONDON.

RE AT EL-DJEM (THYSDRUS).
[Drawing by Alex. Graham, Fellow.]

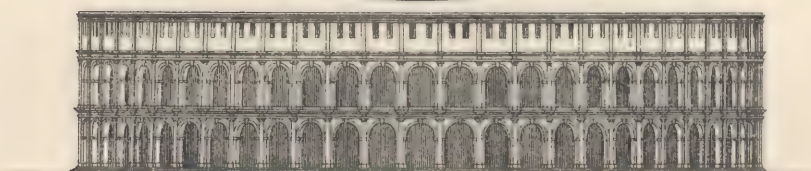
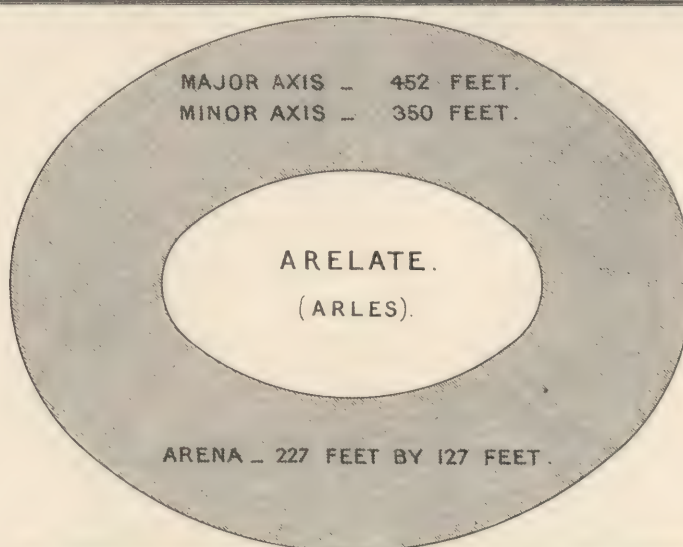
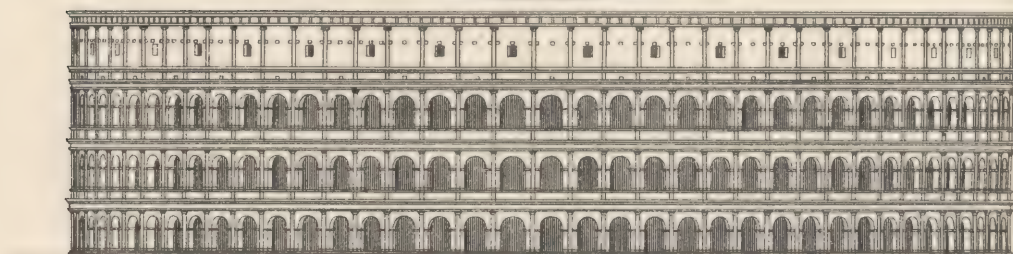
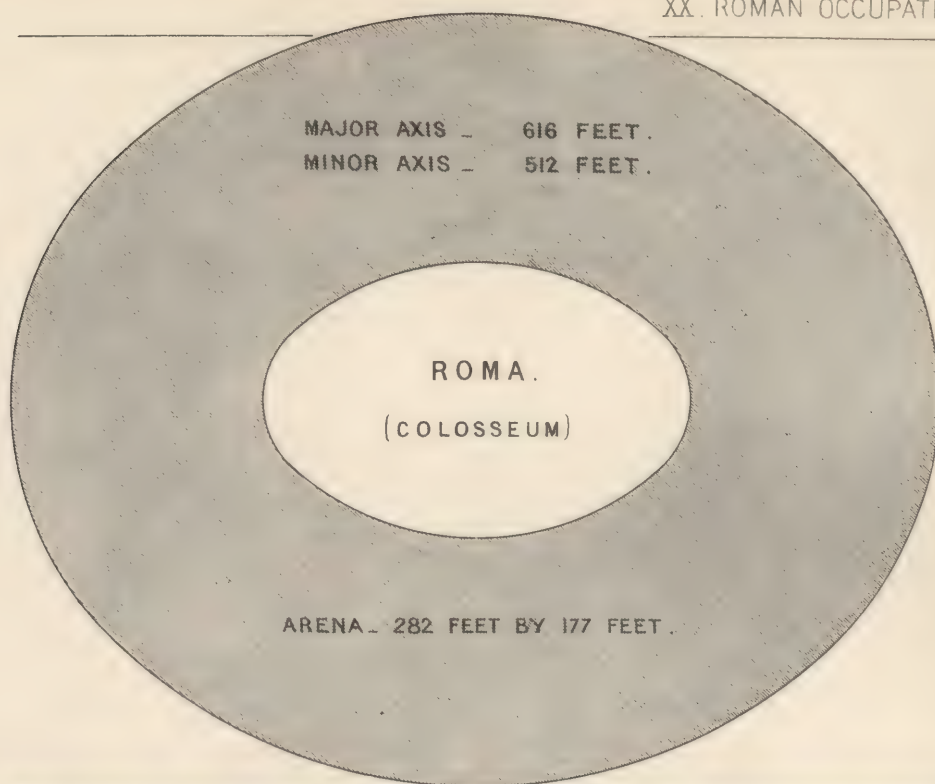


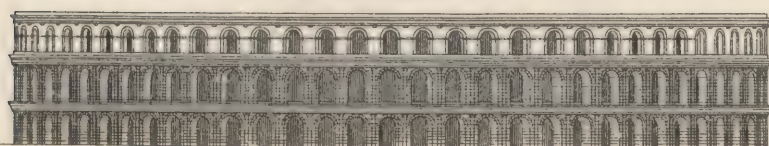
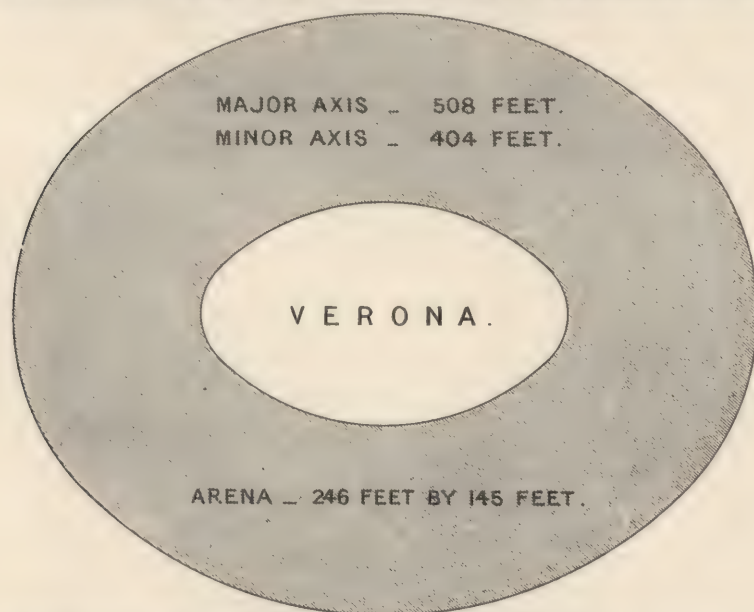
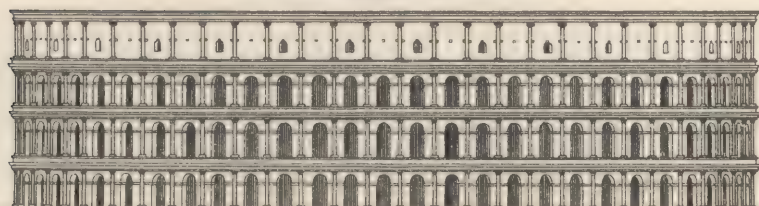
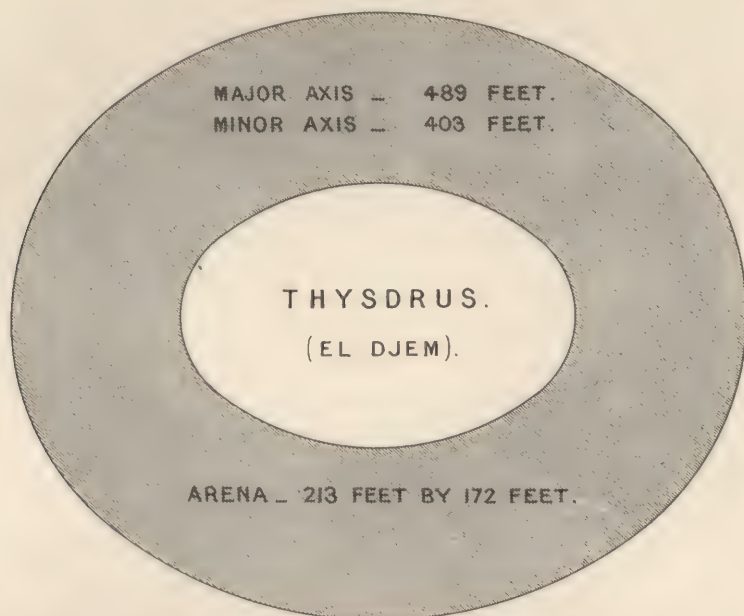


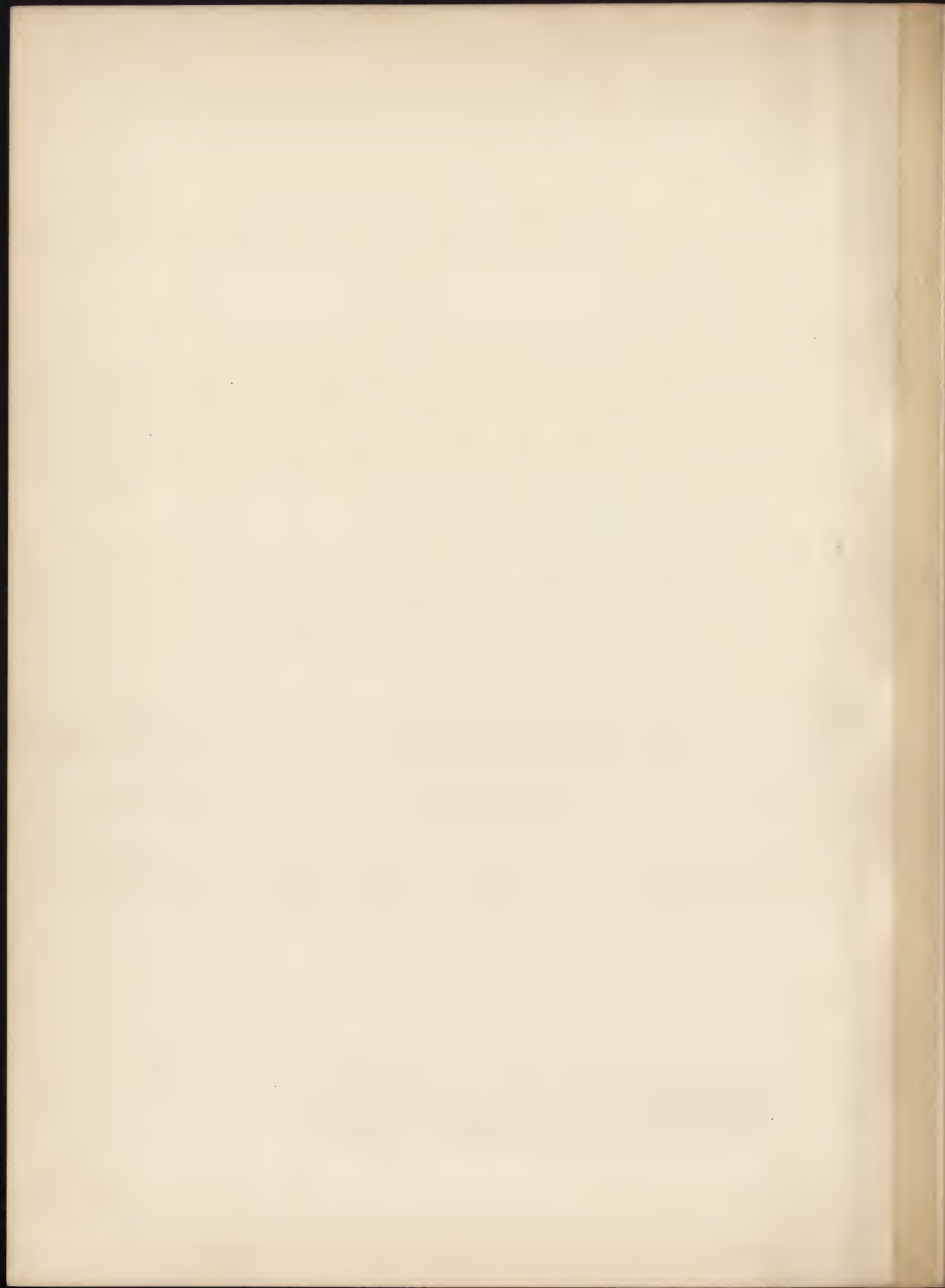
THREE STOREYS OF ARCADES OF THE AMPHITHEATRE AT EL DJEM (THYSDRUS), RESTORED.















REMAINS OF A TEMPLE

[Reduced from a Sepia Drawing]



THE PHOTOCOPY COMPANY, 303, STRAND, LONDON.

AT DOUGGA (THUGGA).

[by Alex. Graham, Fellow]





THE PHOTOTYPE CO. 303, STRAND, LONDON.

REMAINS OF A MAUSOLEUM AT KASRIN (SCILLIUM).
[Reduced from a Sepia Drawing by Alex. Graham, Fellow.]





RUINS OF SUFETULA.



THE PHOTOTYPE CO. 303, STRAND, LONDON.

THE RIVER SBEITLA

[Reduced from Sepia Drawings by Alex. Graham, Fellow]





THE PHOTOGRAPH BY J. G. STANLEY, LONDON.

BACK WALL OF THE HIERON AT SBEITLA (SUFETULA)
[Reduced from a Sepia Drawing by Alex Graham, Fellow.]







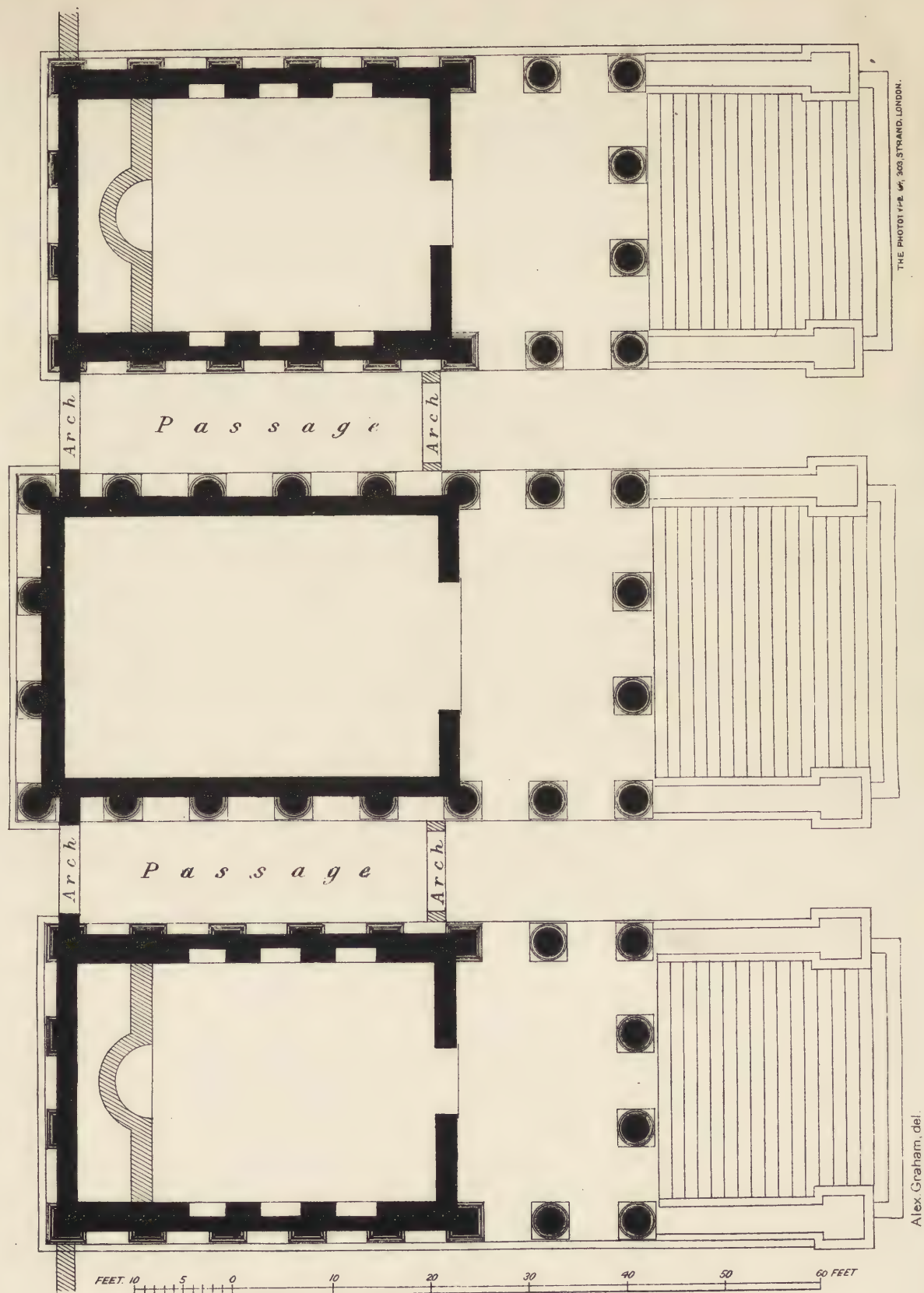
DETAILS OF THE TH
[Reduced from a Sepia Dr



THE PHOTOTYPE COMPANY, 303, STRAND, LONDON.

THE TEMPLES, SUFETULA.
[Photographed by Alex Graham, Fellow.]



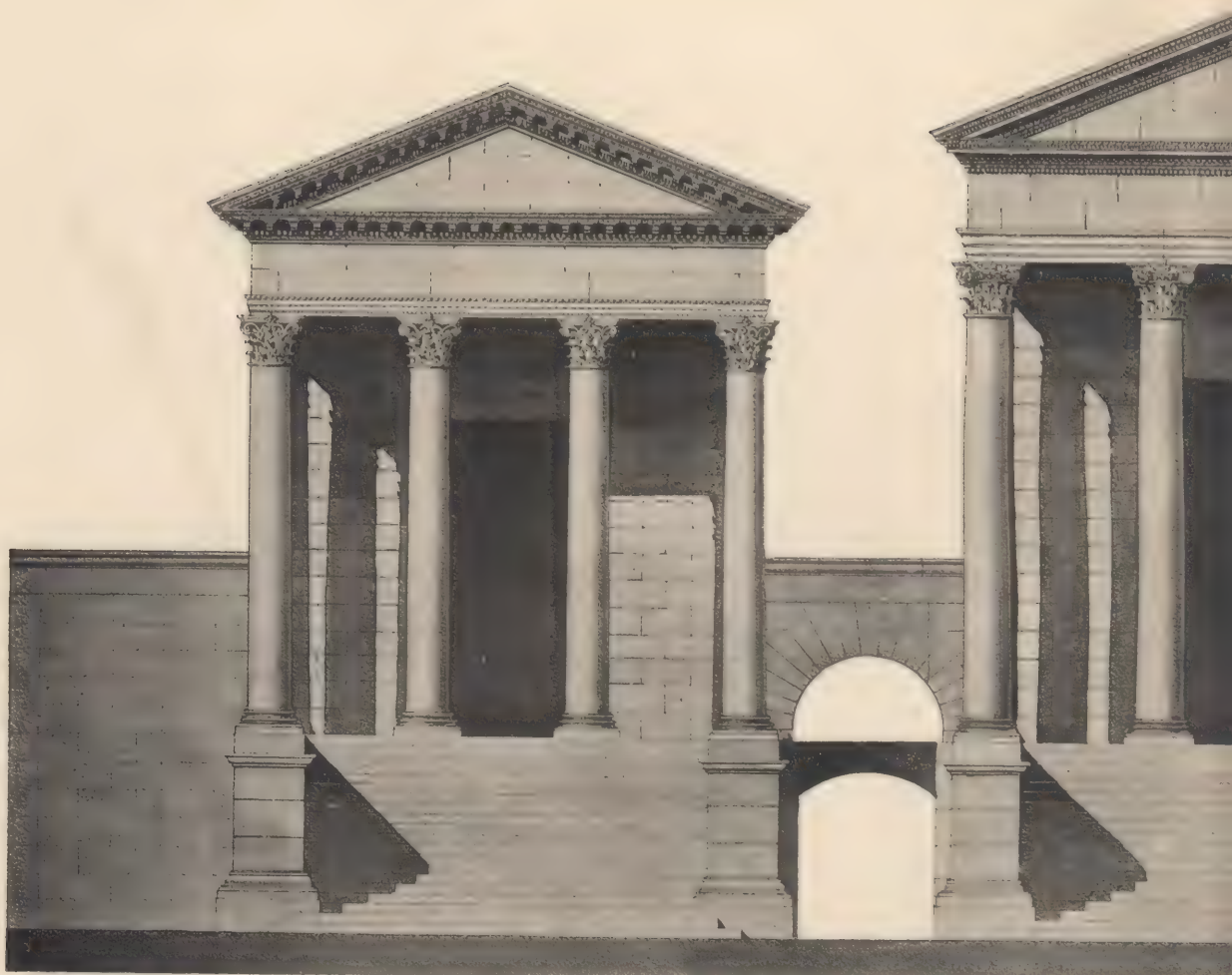


THE PHOTOGRAPH BY W. & A. G. STRAND, LONDON.

RESTORED PLAN OF THE THREE TEMPLES AT SBEITLA (SUFETULA).



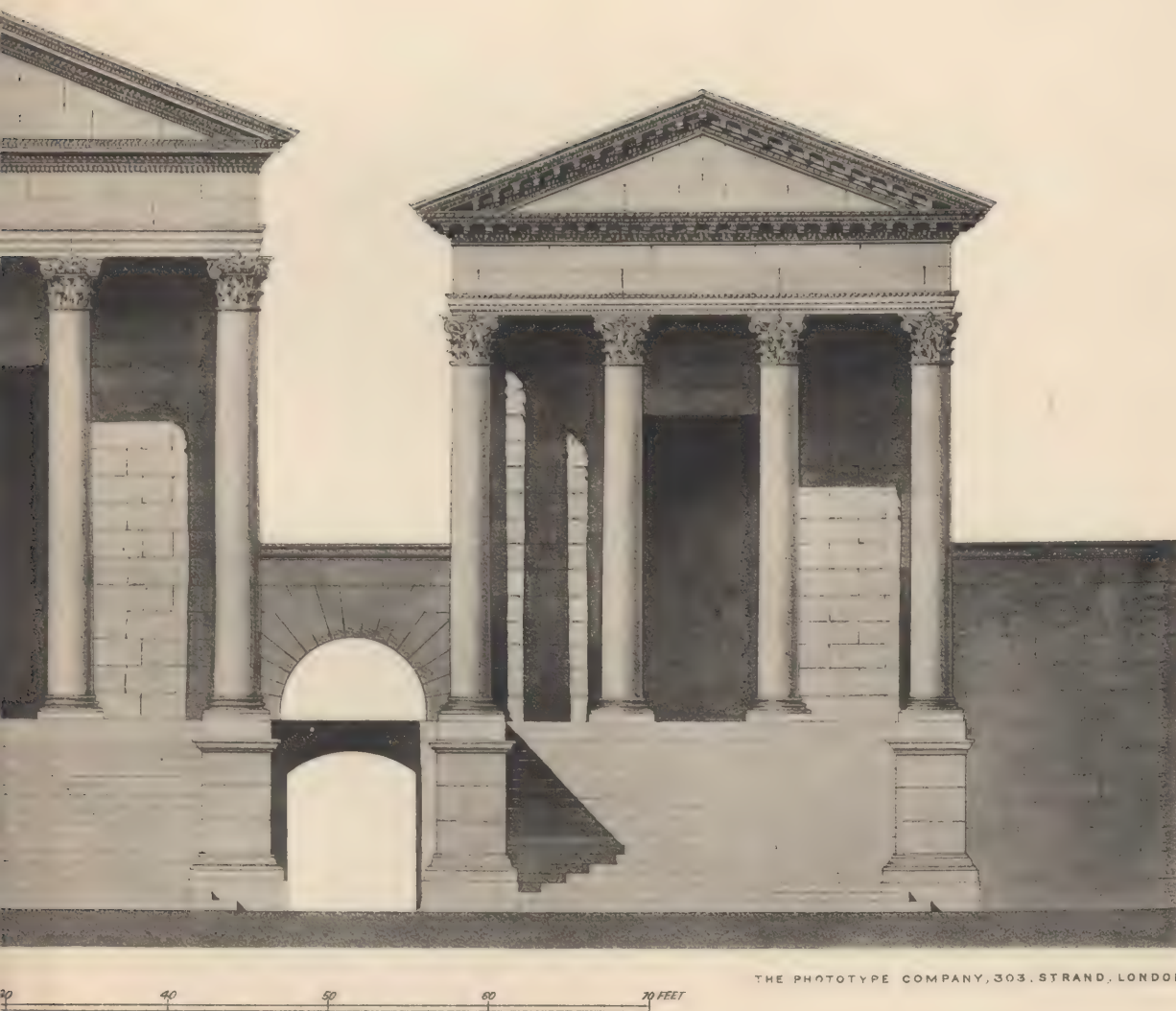




Alex Graham, del.

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THE THREE TEMPLES AT S



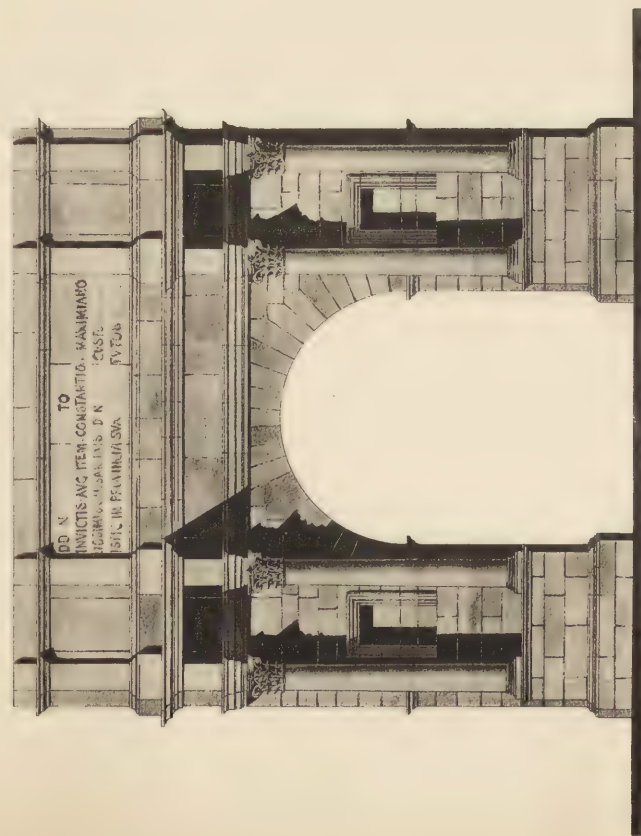
TEMPLE OF AESCULAPIUS (SUFETULA), RESTORED.



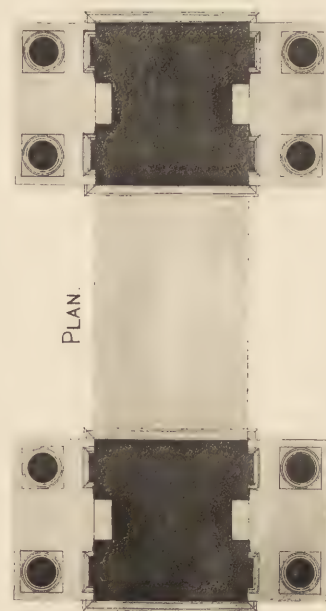


THE PHOTOGRAPH BY MR. J. H. STANLEY, LONDON.

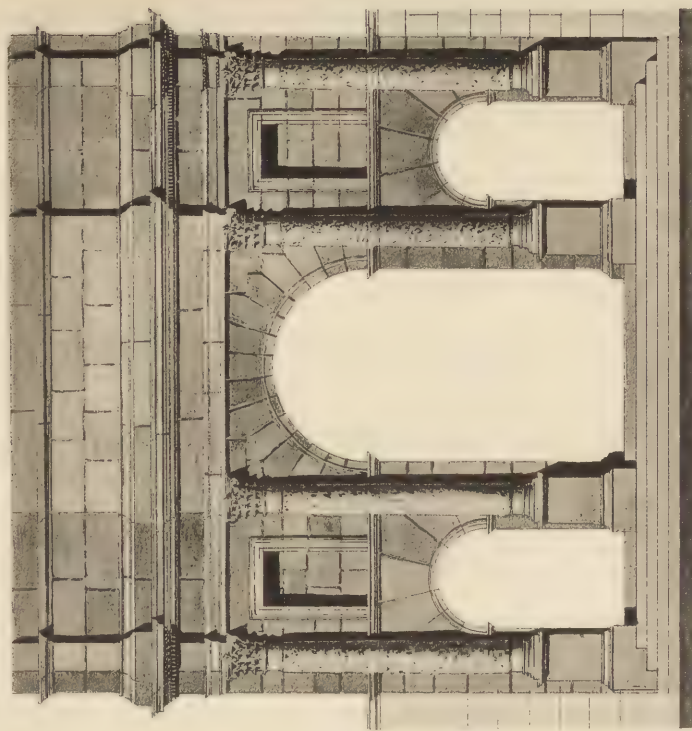
REMAINS OF THE ENTRANCE TO THE HIERON AT SBEITLA (SUFETULA).
[Reduced from a Sepia Drawing by Alex. Graham, Fellow]



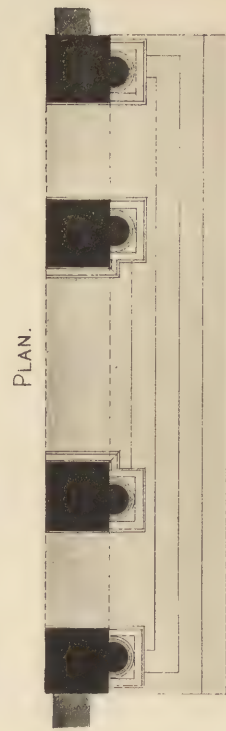
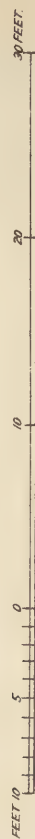
THE TRIUMPHAL ARCH.



Alex. Graham, del



THE ENTRANCE TO THE HIERON



THE PHOTOTYPE C9 303, STRAND, LONDON.



XXI.

FURTHER NOTES ON JAPANESE ARCHITECTURE.

By JOSIAH CONDER, *Fellow (Soane Medallist, 1876).*

[Read on Monday, 31st May 1886, Edward P'Anson, F.G.S., President, in the Chair.]

IN March 1878, I had the honour of communicating a Paper³⁶ to the Institute on the subject of Japanese Architecture, after a short residence in Japan; and on that occasion expressed a hope that I might at some future time enlarge upon those notes—after longer and closer observation, and more extended travel in the country.

To attempt so much in the limits of one of our sessional papers I find no easy task, and I therefore confine myself to describing generally the construction and details of an ordinary temple—for such a building, whether simple or ornate, may be taken as a model of Japanese architectural art, and as the logical development to a state of perfection of modes and processes seen in a less perfect state in other buildings. A general description of Japanese religious buildings will be found in my previous Paper, in which I mention the existence in Japan of two distinct religions—Shintooism and Buddhism.

TEMPLE BUILDINGS.

Though Buddhism may be said to be the popular religion of Japan, this religion and Shintooism have, since the 8th century, been blended in such a way that many Shintô temples are to all appearances of Buddhist style, having pagodas, shrines, images, and all the attributes of the Buddhist religion, often preserving only an historical claim to an original Shintô foundation. Of such a nature is the Shintô temple of Miyo-Jin, Kanda, at Tôkyô [Illustns. li, lii.], founded in A.D. 730, for the worship of the original deity of the country, whose throne was taken by the ancestors of the Mikados.

The oldest existing Buddhist temples, differ little in general style from the most recent structures. It appears that for a time somewhat ulterior to the introduction of the Buddhist style, until now, no important development or modification in the constructive

³⁶ See the TRANSACTIONS, 1877-78, pp. 179-192. The present Paper, in the absence of the author now holding an appointment at Tôkyô under the Japanese Government, was read by his brother, Roger T. Conder, *Associate (Soane Medallist, 1881).*

art of temple building has taken place, the chief changes being decorative, caused by the growth of the decorative arts.

The Japanese themselves assert that their style is not Chinese, but a national wooden style unlike that adopted in the buildings of China, and it must be acknowledged



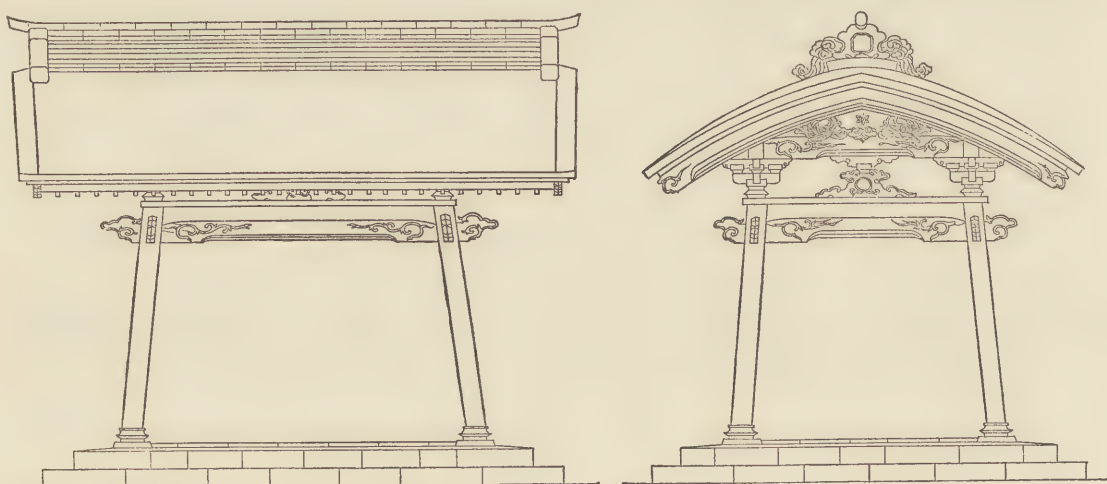
ANCIENT WOODEN STOREHOUSE. SIDE VIEW.

that a comparison of the present buildings of China, with the Buddhist buildings of Japan, shows great differences, strongly in favour of China so far as solidity is concerned. But if historical records are to be trusted, the early wooden Buddhist temples of Japan were erected under the direction of Chinese priests, from drawings which they brought with them; and we are left to infer, either that the Chinese buildings ten centuries ago were like the present Japanese religious structures, or that the Chinese architects of that period, with their Japanese workmen, modified the style of their own country to suit the available material and prevailing tastes of their clients of Japan.

The Japanese have always been most minutely practical and utilitarian, as well as artistic; extremely punctilious and reflectively observant of matters of apparently trivial importance. In all their works, overweening weight is often given to insignificant matters; and this national characteristic, whilst favouring the development of a great amount of delicacy, finesse, and a sort of perfection in their undertakings, has robbed them of the grander and more monumental results which the bolder enterprise and stronger faith of other eastern nations have obtained.

In the planning of Buddhist temples, their distribution and grouping, the landscape surroundings, approaches, and all such matters, with us looked upon too often as subsidiary details of only secondary concern to the architect, are in Japan placed first, and the results are indeed unimpeachable. The temples are for the most part erected upon raised ground, and preferably upon a hill-side, having a higher wooded background, and the enclosures are reached by wide flights of steps and terraces,avenued with trees, and long rows of stone or bronze standard lanterns. The accessory buildings, consist of the pagoda, or five storeyed tower, the holy water basin with its covering shed, the belfry, drum-tower, stage for sacred dances, and in some cases sacred stables, and large store-houses called *Kura*. The isolated position of these structures, which is an all-pervading peculiarity of Japanese architecture, logically deduced from the fear of conflagration is shown in Illustn. liii.

It will be impossible for me to describe these various buildings in detail, in the limits of the present paper, but their general arrangement is shown in the block plan of



the mausoleum of Nikko [Illustn. liii.], and I have added a few notes to the end of my general description [page 204] as to these accessory buildings.

DESIGN AND CONSTRUCTION OF TEMPLE BUILDINGS.

By far the most imposing buildings are those which would be more correctly called mausolea than temples, since they mark the burial places of Princes, and the principal and most highly decorated structures within their precincts are dedicated to their deceased patrons, and form the oratories leading to their tombs. Shrines of this kind exist in several of the principal towns which have at some time or other formed the places of residence of the Imperial Regents; and these are the temples which are most visited by travellers and which have figured principally in descriptions of Japanese religious architecture. I have given in my previous paper a description of the mausoleum temples at Shiba, Tôkyô, and now show some sketches and photographs of these temples and of the mausoleum of Iye-yasu, the first Sho-gun of the Toku-gawa dynasty, at Nikko, commenced in 1616. The description of the mortuary chapels at Shiba, Tôkyô, applies, with slight modifications, to most mausoleum buildings, there being almost invariably the two large rooms, the oratory, and the sanctuary, separated by an interval-room, as at Nikko—where the building measures about 75 feet along the front of the oratory, and about 95 feet deep from the front of the oratory to the back of the sanctuary [Illustn. liv.], in which the shrines, altars, and oblatory tables are placed. In the oratory, usually separated from the interval-room by a screen or blind, the small lacquer tables, containing rolls of the Buddhist Scriptures are arranged.

It is only within the last ten years, however, that these mausolea have been thrown open to the native public, revealing to the popular gaze the costly splendour which their

vice-regal rulers lavished upon their tombs. Before, only the gilded coppersheathed roof tops met the vulgar gaze, the high enclosures and barred gateways forbidding nearer intimacy. The popular temples have generally fewer subsidiary buildings,—are larger and bolder in proportion and less highly decorated, but the constructive detail is much the same. They stand in more open parts of the cities and are without the numerous courts which mark the approach to the mortuary shrines. They have generally one outer enclosure with a grand, two storeyed gateway, continually left open to the public. The water basin and belfry are seldom omitted, but the pagoda is often wanting. The principal building, called the *Honden*, contains, in some cases, a large bronze image, and in some cases statuettes of wood or metal encased in small shrines and revealed only on special occasions. Some of the *Honden* contain wooden statuettes of the founder or some venerable disciple of the sect, regarded with almost equal veneration with the presiding deity. In many temples there exist two *Honden* side by side, one for the founder and one for the deity, or one for each of two separately adored deities. This principal sanctuary is generally an oblong building raised some four feet from the ground. In some cases there are an inner and an outer sanctuary—separated by an interval-room, as in the mortuary chapels—in others the two sanctuaries are separated only by a screen or blind, the separation being sometimes emphasised by a different treatment of the ceilings of the two. These buildings vary greatly in size, there being in the larger temples an interior peristyle—or other arrangement of columns, often of great size, to support the roof,—forming an ambulatory or aisle round the oratory, or sometimes round three sides of it leaving the fourth to be occupied by the sanctuary and secondary chapels on either side.

The temple of To-dai-ji, at Nara, which contains a celebrated bronze image of Buddha, 53 feet high, measures 290 feet long, 170 feet wide, and 156 feet high, being a two storeyed building. The temple of Miyo-Jin, Kanda, Tôkyô [Illustns. li., lii.], measures 66 feet by 27 feet, by 40 feet high to the ridge.

The building is invariably surrounded by a railed gallery, reached by a flight of steps in the centre of the approach front, the balustrade of which is a continuation of the gallery railing. This gallery is sometimes supported upon a deep system of bracketing, corbelled out from the feet of the main pillars. Within this railed gallery, which is sheltered by the oversailing eaves, there is in the larger temples a colonnaded loggia passing round the two sides and the front of the building, or in some cases placed on the façade only, as at Miyo-Jin, Kanda [Illustn. lii.]. The ceilings of these loggias are generally sloping, with richly carved roof timbers showing below at intervals; and quaintly curved braces connect the outer pillars with the main posts of the building. Some temples are to be seen, in which the ceiling of the loggia is boarded flat and decorated with huge paintings of dragons in black and gold. The intercolumniation is regulated by a standard of about six or seven feet, called the *ken*, which is divided into twenty-two minutes, each minute being subdivided into twenty-two seconds.

The *ken* in common use is six Japanese feet (*shaku*), the *shaku* being 11.93 inches or a fraction less than the English foot, but the temple and palace builders often adopt an arbitrary *ken* equal to six and a half or seven *shaku*, by which a slight

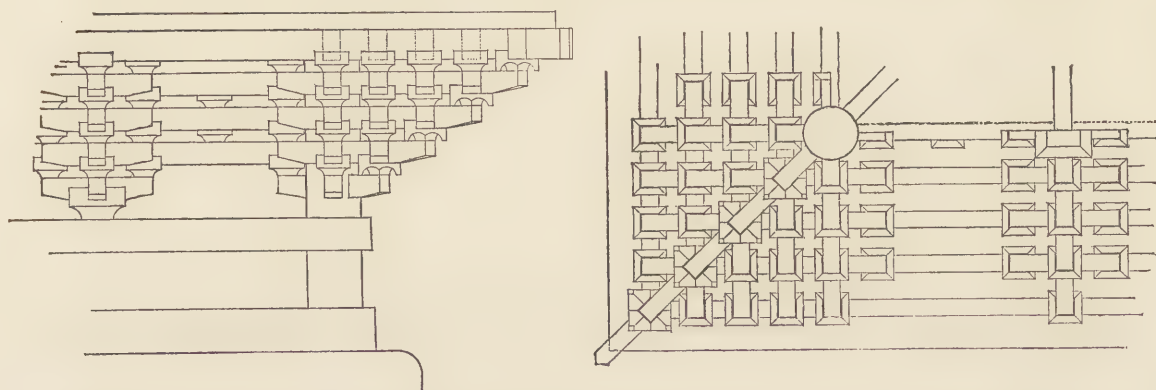
increase of proportion is obtained for the whole building and for the mats with which the floors are covered. The mats always measure one *ken* long, by one half *ken* wide, and the sizes of all the rooms, whether matted or not, are some multiple of these mats.

In small buildings the distance from pillar to pillar is only one *ken*, in others of larger size a distance of two *ken* between the posts is used. This intercolumniation applies to the detached pillars of the porticos and colonnades, and also to the posts of the wall enclosures, which are also visible both inside and outside, the filling in being slightly recessed. The wall posts, however, are framed into a large horizontal sill of somewhat greater projection, which runs all round the building, being halved at the angles. The wall space is again subdivided by horizontal timbers, apparently intersecting the pillars, but in reality halved on to them, on the front and back, and bracing them together. The heads of the wall posts are tied near the top by thinner deep pieces tenoned and keyed into them. The position of the horizontal timbers is regulated by the heights of the doors and windows, and sometimes a break in the continuity of these beams is occasioned, but the general result of the treatment is that the whole mural space, not filled in with doors or windows, is divided into regular oblong panels, which sometimes receive plaster, sometimes boarding, and sometimes rich framework and carving or painted panels. Diagonal bracing or strutting is nowhere to be found, and in many cases the mortises and other joints are such as to very considerably weaken the timbers at their points of connection. In my opinion it is only the immense weight of the roofs and their heavy projections which prevents a collapse of some of these structures in high winds. The principal façade of the temples is filled, in one, two, or three compartments, with hinged doors, variously ornamented and folding outwards, sometimes in double folds. From these doorways, generally left open, the interior light is principally obtained, windows, as we generally understand the term, being rare. In some of the more important buildings, however, a method is followed of filling in the chief compartments of the front and sides with large moveable latticed shutters in two halves, the upper half being hinged at the top so that it can be raised and attached on the outside to metal rods hung from the eaves. Inside such openings ornamental rolled blinds of bamboo strips are suspended, as a screen from the sunshine [Illustrns. li., lii.] A striking peculiarity of all Japanese buildings is, that direct light from the sky is rarely obtained, owing to the lowness of the openings and the great projection of the eaves; the light of the interior is a reflected light from the ground, except in very isolated buildings, and when the sun is low. This inconvenience, not so much felt in the old style of sitting, reading, and writing upon the floor, is an insuperable one when raised tables and chairs are employed in purely Japanese buildings.

Small low windows are occasionally introduced in the centres of the closed wall spaces, and such fenestrations though rare are extremely interesting on account of their curved and cusped forms. They have generally a projecting moulded frame, straight at the bottom, with straight sides sloping inwards towards the top and finished by a variously cusped crown of picturesque shape. The architect, in search of forms in the native style which could be adapted to masonic structures, finds in these features one of the rare

examples of combinations translatable into stone and logically applicable to an arcuated style of architecture.

An elaborate cornice of wooden bracketing crowns the walls, forming one of the principal ornaments of the Japanese buildings. The bracketing is arranged in groups, placed immediately over the pillars and at certain intermediate intervals, the intervening spaces being variously decorated. In some of the larger gateways and other buildings—where elaboration is obtained without sculptural or polychromatic decoration—the clusters are so thickly placed that the whole cornice is a continuous mass of bracketing. The arrangement of each group of bracketing consists of a series of projecting wooden corbels in increasing stages, with cushion-like blocks between. From the centre or corner of such bracketing short, horn-like blocks of wood project forwards and downwards. These pieces are sometimes curved and moulded, and sometimes carved to represent the heads and trunks of elephants or the snouts of imaginary monsters. Longitudinally the different courses of brackets are connected by heavy horizontal beams in projecting stages, their decorated fronts and soffits forming with the intermediate hollows the chief decoration of the cornice. The intermediate hollows are filled with



boarding, sometimes coved and ribbed and sometimes richly carved. Between the head of the pillars and the first projecting beam a frieze-like space occurs, which in most buildings is highly decorated. The treatment of the cornice gives to the roof a projection of three or four feet, and beyond this again the eaves project some three or four feet more, at the least, over and beyond the gallery. The underside of such projection is rendered slightly by a system of false rafters in several receding courses, the ends of the several rows of rafters being capped with bronze. When the temples have an external colonnade the system of bracketing employed in the cornice of the main walls is repeated over the detached pillars of the peristyle, but at a lower level; and the frieze consists of pierced carving in the form of dragons, birds, or flowers, finished equally upon both sides.

The whole disposition of pillars, posts, brackets, and rafters is harmonically arranged according to some measure of the standard mentioned. The width of each rafter is generally ten seconds, and the intermediate space twelve seconds, the two together forming one minute, and such combined measurement repeats twenty-two or forty-four

times between each columniation. This module of the combined width of one rafter and space is called a *shi*, and is often used as a scale of measurement in fixing minor proportions. Again, the widths of the cushions of the bracketing equal the combined width of two rafters plus one intermediate space, or thirty-two seconds in all. In short, a rigid system of centering is followed in designing subsidiary parts; even the mouldings and chamferings are a definite subdivision of the beams, posts, and blocks upon which they are cut.

In these temples the long cornice beams, which extend horizontally from the brackets, requiring additional support between the principal corbelled clusters, are partly upheld by minor arrangements of bracketing supported upon ornamental strutting of a curved form. The native name (*Kaeru-mata*) means frog's-leg form, a name which well expresses the general outline of the arrangement [Illustn. lv.] Between the pairs of curiously curved struts, which spread outwards like the legs of a frog, a short central post is often placed. This is rounded at top and bottom, ending at the top in a curved boss or tail projecting over the front of the supporting lintol. When the post is not used between the struts, the curved space enclosed is filled with a panel of carving, in high relief, representing some such subject as the stork and pine tree, or chrysanthemum and jay [Illustn. lv.] Sometimes the struts themselves are elaborately carved to represent clouds or water. The flat spaces left between principal and secondary bracket supports are decorated, sometimes in colour, and sometimes by means of oblong panels of carving which is mostly very realistic in its execution. The faces and soffits of the cornice beams are decorated with polychromatic diapers upon a white or gilded ground; and the intermediate spaces are boarded, in flat or curved surfaces, with small projecting ribs.

A very important feature of the façade is the portico or porch-way, which covers the principal steps and is generally formed by producing the central portion of the main roof over the steps, and supporting such projection upon isolated wooden pillars braced together near the top with horizontal ties, curved, moulded, and otherwise fantastically decorated. Above these ties are the cornice brackets and beams, corresponding in general design to the cornice of the walls, and the intermediate space is filled in with open carvings of dragons or other characteristic forms. The lateral ties of the portico are made to dip in a double curve to accord with the slope of the balustrade.

The detached pillars are square or circular, the circular being often reeded and the square moulded upon the edges. They are rounded slightly at the top and bottom, having generally a cast or embossed ornamental shoe, and they rest upon a low moulded stone base. The top receives a substitute for a capital in the form of a square hollowed cushion of the same diameter as the column. The diameter of such pillars, as well as that of the posts of the building, is generally about one minute and twelve seconds.

The portico is sometimes covered by a gable roof, cutting into the main roof, but having a slight slope downwards and a lean forwards. The gable is in some cases of a double curved form, convex at the top and concave near the eaves; sometimes it is of a continuous flat convex form, and occasionally it is of the ordinary concave form which is, followed in the main roof. Such gable has a considerable projection from the cornice

the projecting purlins and curved oversailing rafters being richly ornamented. The barge board is cusped and enriched with carved pendants, and the recessed gable surface is filled with a rich design in carving. Upon the slope of the main roof, immediately over the intersection of the portico roof, a central semi-gable is often introduced as a feature of the façade, which corresponds in most points of detail and ornamentation to the end gables of the building, but its ridge is generally lower than the main ridge.

The forms of roof used to cover the main building are various, but mostly they commence in a steep slope at the top, gradually flattening towards the eaves so as to produce a slightly concave appearance, this concavity being rendered more emphatic by the tilt which is given to the eaves at the four corners. The upper or steep portions of these roofs terminate in end gables at a point vertically above the end walls of the sanctuary, but the lower and flatter portion, which projects over and beyond the colonnade and gallery, is continued round the ends in a hipped form below the gable. Thus the appearance of the ends of the roofs is half hip and half gable. Heavy ribs of tile cresting with large terminals are carried along the ridge, hip, and along the slope of the gable, set some little distance back [Illustn. lvi.] The result of the whole is very picturesque, and has the advantage of looking equally satisfactory from any point of view. The harsh angles produced by a hip-gabled roof are softened off and the lines of intersection flow one into the other in the most natural manner. The roofs of the Buddhist temples, as their native name implies, were, from the time of their first introduction from China, covered with tiles. It is supposed that at an early period these tiles were generally glazed in colour, but in late times black or smoke-burnt tiles have been invariably used, the arrangement of alternate flat tiles and roll tiles being followed. At the eaves the roll tiles have circular caps and the flat tiles edgings, which are stamped in various patterns. The ridge and hip crestings consist of several layers of tiles in mortar arranged so that the ends form patterns, and are crowned by tile capping. The terminals are of a saddle-back form with curved top, and foliated flanks, and having patterns of various kinds moulded upon their surfaces. In temples of the best class the whole tile work is replaced by wooden tiles and terminals covered separately with thick copper-plate. In such cases there are stamped and embossed ornaments attached to parts, which are rendered more ornamental by gilding.

A slight tilt is given to the corners of the roof, so that the eaves curve slightly upwards towards the ends, and the hip-tile cresting has a *retroussé* form at the end. The arrangement of rafters under this corner are various, sometimes they follow a radiating arrangement; and sometimes they intersect into a large hip piece which projects forward and is made highly ornamental. The complete gable is to be seen in some temples instead of the combined hip and gable just described; in such cases the gable surface is divided by a series of horizontal beams with bracketing and carving between, and blank spaces are filled in with plaster or grotesque carvings or lattice work. A somewhat rare example of gable decoration is to be seen in the famous storehouses attached to the mausoleum at Nikko [see Appendix, p. 210]. Here a long vertical post divides the wall surface of the gable, from the head of which spring curved ties similar to those described

in the porticos, and on each side of the central post are full-sized carvings of elephants, coloured on a gilt ground. The whole of the gable is elaborately coloured. In examples of this kind the carved barge-board is very rich and heavy, having several carved pendants and heavy metal bands attached to it.

The interior arrangement of wall columns, horizontal beams, and cornice bracketing, corresponds with that on the outside, the top beam of the bracketing supporting the panelled ceiling, which is sometimes coved at the edges. The Japanese ceiling is invariably boarded and subdivided by ribs into small rectangular coffers; sometimes painting is introduced into these panels, and lacquer and metal clasps added to the ribs. When the temple is of very large dimensions an interior peristyle of pillars is introduced to assist in supporting the roof, and in such cases each pillar carries profuse bracketing corresponding to that of the cornice. The construction of the framework of the Japanese roof is such that the weights all act vertically; there is no thrust on the outer walls, and every available point of the interior is used as a means of support; so that in a large temple, although the roof is one, and there is no clearstorey, the interior peristyle becomes a necessity in order to carry the large beams on which the roof is built. The floor of the interior is partly boarded and partly matted. The shrines, altars, and oblatory tables are placed at the back in the centre, and there are often other secondary shrines at the sides. Drums and bronze gongs are among the furniture which is always to be found in these temples. In those of the best class the floor of the gallery and the central portion of the main building from entrance to altar is richly lacquered, in those of inferior class they are merely polished by continual rubbing.

THE METHODS OF DECORATION OF TEMPLES.

Such temple buildings as are not externally adorned with colour decoration, are, for the most part, finished in plain wood, showing the grain. The wood employed, except for the very commonest erections, is a species of native elm called *Keyaki*, which has a reddish brown tint, changing with age and, where exposed to the weather, to a light purplish grey. The carved panels, bosses, and brackets of such structures are sometimes executed in *Keyaki* and sometimes in camphor-wood called *Kusu-no-ki*. The extremities of projecting timbers and the edges of such wood-work as expose the cross grain, are coated with a mixture of whiting and size, for the purpose of preserving the exposed ends from the attacks of insects and from speedy decay. In buildings of a superior class, however, such whiting is replaced or covered by brass caps fixed to such extremities, and these metal fittings are gilt to preserve them from corrosion. A pattern is generally incised upon the brass ornaments and filled in in *niello*. In addition to these metal cappings, ornaments of the same material are added to the points where beams and pillars intersect: to the corners of door frames and panel frames, and to the bases and neckings of posts. The outlines of such metal bands or sockets are of variegated flowing patterns, and their surfaces are invariably engraved or embossed. The large cusped pendants of the gable boards, and the gable boards themselves are richly loaded with embossed gilt metal work. Gilding is also added to the roof cresting and terminals, and to the

extremities of the tile rolls. Thus an unpainted temple of superior finish presents an appearance of pale ashen grey touched up richly with gold. The best buildings of the Shin sect of Buddhists are perhaps the finest examples of this uncoloured treatment. The *Shinshiu*, though allowing interior colour decoration, appear to avoid it for the exterior of their temples, which are consequently richly ornamented with delicate carving and metal work. Such refined luxury does not contrast unfavourably with the more gorgeously decorated display made by other sects. The Kiku-no-Mon, or Chrysanthemum Gate, of the temple of Hangwan-ji, at Kyôto, is a striking example of this treatment.

Colour decoration applied to the exterior of religious buildings has several grades or degrees of richness. The commonest and coarsest kind of colouring may be seen in some of the temples of the Riobû Shintô style; for, though the main characteristics of the pure Shintô cult are primitive simplicity and absence of ostentation, yet in the Riobû or mixed Shintô these early principles are grossly violated and the most debased forms of Buddhist art are mixed with those of the earlier cult. The ruder kind of decoration here referred to consists of a coating of red or black applied to the greater part of the exterior, including the posts, balustrades, and main wall surfaces, with the addition of a little bright colouring to the frieze panels, and sometimes to the cornice brackets. The black surface colour is composed of Chinese black (Indian ink), ground and mixed with animal size. For portions very much exposed to the weather black lacquer is used instead of the above, the lacquer being, as is well known, a preparation from the lacquer tree of Japan, and the black, acetate of iron, made by steeping iron filings in vinegar. The red surface colour is, for the more common decoration, a mixture of red oxide of iron and animal size. In superior buildings, vermilion mixed with size, or vermilion mixed with lacquer, is used.

The common red is a raw, harsh colour, inclining to orange, and is only to be seen on the commoner temples, but the real vermilion red to be seen at Nikko and in other notable shrines is a deep, rich colour, slightly crimson in tint. A building coated with the common red iron oxide is generally of too poor a class to receive the various metal adornments peculiar to the best architecture, and their place is sometimes supplied by rough representations of such ornaments painted in yellow ochre, in imitation of gold. An example of this false treatment is to be seen in the temple of Hachiman at Kamakura; probably in this case, however, only intended at first as a temporary expedient, as the temple is one of considerable importance. The application of colour decoration to exteriors commences generally with the lintols or ties near the top of the posts or pillars. From this height the different beams and brackets, together with the flat spaces and raised carvings between, are diapered, arabesqued and variously picked out in bright colouring and gilding. Such a treatment imparts a light elegance to the otherwise ponderous eaves of the Japanese temple buildings, and the deep sun shadows beneath the massive projections assist in subduing and harmonising the bold contrasts of colour employed. The decorator uses fearlessly the greatest variety of colours in juxtaposition, but generally separates adjoining tints by means of a white or a gold line. The blocks and cushions of the bracket groups are coloured differently on their several faces, the colours being

sometimes gradated into different tints, of which the central one is the lightest; and the outside edge has a white border finished with a gold line. The different tints of the same colour are produced by the addition of whiting to the pigment.

The centre of these members has a narrow white band, in the middle of which is a black line intersected by small dots of gold. The under hollows of the blocks are specially ornamented with a row of trefoils outlined in white with coloured centres. The ordinary colours used for the bracketings are purple, brown, blue, green, madder colour, and dun colour. The decorators seem in fact to have employed all the colours at their command, but the natural impurities of the pigments, as well as the methods of softening down in gradations and adding white and gold borders, have helped to prevent anything like harshness or vulgarity. In some recent decorations, where the artists have used crude colours of modern European manufacture, there is no lack of vulgarity and discord.

Colouring in shades or gradations is a very favourite mode of decoration, and is called *un-gen*. A surface to be painted blue, for instance, will first be coated in white, and then a small oblong strip of paper is pasted upon the centre of the space, which is then coated with a mixture of whiting and indigo, producing a sky-blue colour. The strip of paper being removed, a white band remains in the centre; another slip of larger form is then temporarily pasted upon the surface, and then a coat of a deeper blue colour is used. When this strip is removed, a pale blue band, with the original inner band of white, remains in the centre of the dark blue surface. A few lines of black and gold are often added to the central panel. Lines of gold round the corners and edges of the different members give a finish to the whole, and the presence of the white band and gold lines has a marvellous effect in harmoniously softening and blending the otherwise violent contrasts of colour employed in such decoration.

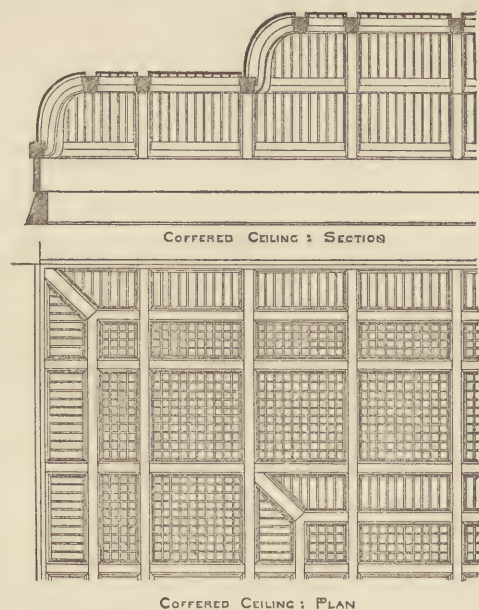
The interiors of such principal sanctuaries are also in most cases elaborately coloured. Much of the wall space below the lintols is taken up with slides and openings, but such closed portions as remain have large mural paintings attached to them [Illustn. lvii]. These paintings, which are generally upon a gold ground, represent animals, birds, and flowers, having some sacred connection with the Buddhist tenets. A common device is that of *shishi*—a kind of imaginary lion, amidst peonies. The lotus is often represented, and sometimes the sacred phoenix called the *hō*. Examples exist in which the interior pillars of temple buildings are polychromatically embellished, but such cases are rare. One instance is in the upper storey of the large gateway of the Chion-in temple, Kyōto, where waves and monsters are painted on the pillars. It seems to be a recognised law that no decoration shall be applied to supporting pillars detrimental to their appearance of vertical strength. For the most part plain black or red or gold is used until reaching nearly the summit of such internal piers, the varied decoration commencing at or a little below the embroidered hangings conventionally painted at the tops of these shafts [Illustn. lviii]. Such decoration bears the name of *gohei*, on account of its derivation from drapery or paper hangings suspended in temples in honour of the deities. In form, the *gohei* pattern resembles conventional looped and folded drapery, and is loaded with diapers, medallions, and borders, of varied colour and design.

This ornament sometimes stops within a few inches of the top of the shaft and the decoration of the pillar finishes with short vertical bands of alternated colour outlined in white and gold, a method of decoration closely resembling Egyptian examples. Such a treatment is, however, not invariable. At Nikko we find the *gohei* pattern, and above it gold arabesques and powdering of coloured flowers upon a deep blue background. The groups of brackets which form the main features of the cornice upon the inside as well as upon the outside of religious buildings, are mostly coloured according to the principles already described. At Nikko, in the interior of the oratory, these bracketings, instead of being coloured, are lacquered black with gold edgings, but this is unusual, and the effect can hardly be called satisfactory, as it produces a feeling of heaviness. The arrangement of lintols, panels, beams, and the frieze spaces below and between the cornice bracketing, hardly differs from that already described for the exterior of buildings. The members are somewhat smaller in scale than on the exterior, and perhaps more highly coloured and more delicately finished. The beams receive coloured diapers upon a gold ground, or representations of birds or dragons amidst arabesques of flowers or blotches of formal clouds. The Japanese conventional cloud pattern is more realistic than the mediæval cloud band to which we are accustomed in paintings of the Middle Ages. It consists of a mass of trefoil flourishes ending in flamboyant tails, and in outline is perhaps the best conventionalized delineation that could be given of the clouds of the *cumulus* type; but the colouring robs it of any realistic quality it may have. The cloud lobes receive varied colours, red, blue, or green in the centres, graduated to lighter tints upon the outside, and are finished with a white and sometimes a gold edging.

The recessed spaces between beams and lintols, and between the cornice bracketing, are sometimes flatly treated in painting as described for the exterior of buildings; but in the more highly decorated interiors they are filled with carvings, which are pierced if in internal partitions. These carvings are heavily gilt, and sometimes have the addition of colour. The subjects for carving are various, but they may be classified as—Flowers and plants; water and water plants; water and water fowl; birds and foliage; tree trunks and branches; birds and bamboo; *shishi* (lions) amidst bamboos or amidst peony bushes; birds in clouds; sacred animals amid clouds. When a panel or band is decorated with foliage and flowers alone, the arrangement of the leaves and stems is generally formal and conventional, but when vegetation is introduced as secondary to carvings of birds or beasts, the treatment is more realistic. Birds of the brightest plumage, such as peacocks, pheasants, or the mandarin duck, are generally chosen for representation, being highly and realistically coloured. In the foliage much gilding is used, the effect of too much green not being considered satisfactory. All such coloured carvings receive first a coating of whiting and size, upon which the colours are laid. Gilding is always laid upon a red or yellow-sized surface to give it depth and brilliancy. Different tones of gold are used, and various degrees of polishing [Illustrn. lix].

Interiors possessing a high degree of mural decoration invariably have coloured ceilings. Such ceilings are divided into square or octagonal coffers by means of raised

ribs. These ribs are mostly lacquered black and have the addition of gold lines on their edges, and handsome brass socketings at their intersection. Such ceilings do not finish



square against the wall but have a coved cornice, the ribs being continued in a curve on to a wooden band, which forms the lower border of such cove. The flat coffers of a ceiling, and the curved panels of the coving are filled in with richly coloured decorations. Sometimes, however, the covings are filled entirely with numerous curved ribs, lacquered black with narrow gilt spaces between.

The black ribs are invariable where coloured panels are used. In some buildings, such as the two-storeyed gateways where a bolder style of decoration is used, the ceilings have no ribs, but are flatly boarded, and receive large paintings of dragons or angels occupying the uninterrupted space. For example, the

temple building of Nanzenji, at Kyôto, has a ceiling about 1,600 feet in area, boldly painted with one large dragon in black and gold. Such paintings are fine examples of the bold style of caligraphical art which the Japanese so much value. The painter, in executing such a work, has the boards which are to form the ceiling spread upon the floor below. Having then roughly outlined his subject with a burnt stick, he proceeds with an enormous brush dipped in Indian ink to dash in a vigorous outline, which he does with considerable bodily exertion, and by means of many vigorous turns of the brush and rapid crawling over the surface from top to bottom. The bold, vigorous line thus produced is greatly fancied by the Japanese, and occasional ragged strokes or splashes from the too full or too empty brush, add to the effect in the eyes of the connoisseur. Small accidents, such as splutterings of ink between the outlines, are easily effaced by the colour which is afterwards added. This colouring is put on with a mixture of whiting in such a way as to leave all the black outlines exposed. The colouring is sometimes merely an amber coloured base upon which gilding is laid.

Most of the great works of the Japanese masters have been mural panels painted upon the walls, wooden doors, or paper slides of buildings. The paintings upon moveable screens, and the hanging pictures called *kakimono* are not gallery pictures, but are essentially decorative features of rooms. The *kakimono* are simply portable mural panels proportioned to the particular recesses they are intended to occupy, and arranged singly or in triplets. The same may be said of the large compositions designed as altar pieces for the temples. Painting was introduced from China in the 6th century, at

about the same time as the Buddhist faith, the saints' emblems and mysteries of which it served principally to depict. The painter was then an artisan whose concern was as much with the application of chromatic combinations, in diaper and arabesque, to the beams and columns of a building, as with the elaboration of flower and figure subjects for the wall spaces and ceilings.

The first important works associated with the name of a great Japanese painter were the panel decorations of a portion of the palace at Kyôto. These were painted by the artist Kanawoka in the 9th century, and represent the different Chinese sages. Up to this time (*i.e.* from the 6th to the 9th centuries) such work seems to have been mainly executed by Chinese masters. In the hands of the native artists the decorative work underwent certain modifications, losing much of its exotic character, and assimilating itself more with the purely native taste; it drew largely upon surrounding nature for motive and subject, but never aimed at purely pictorial and illusory representation to the neglect of decorative effect.

Statuary, moreover, has never attained in Japan that isolated position which it holds in Europe as an outcome of the Academies. Detached statues in bronze, very rude ones in stone, and small statuettes in wood have always existed in the country, principally taking the form of temple or household gods; but the names of the famous sculptors of Japan are mainly associated with the friezes, cornices, and panels of buildings which they have decorated, and the treatment of their subjects is chiefly governed by the demands of scale, proportion, and composition imposed by the architecture.

Behind the general impression of harmony produced by the decorative architecture as it existed and still exists in the best examples of the Buddhist style, there is revealed, upon careful analysis, a combination of curiously incongruous elements. The weird and grotesque are blended with the serene and natural. Archaic forms, which one must follow back to Indian creeds for their original meaning, are quaintly combined with free and flowing natural forms. Demons, monsters, and crude conventional representations of foreign or imaginary animals, are painted side by side with the birds, flowers, and landscapes of the changing seasons. The subtle elements of wind, cloud, water, and spray are in one place represented in definite conventional lines, which convey but a vague idea of their respective force and motion; and in another by soft, dreamy touches and blurred effects. There is everywhere to be traced the influence upon an artistic Oriental mind of the beautiful forms and colours of the mundane universe, combined with the external influence upon his imagination of the Buddhist religion, dictating awe-inspiring shapes and mysterious symbols, which he accepted and depicted as a portion of his superstitious belief and homage.

Decoration was developed in buildings of different type in accordance with a system by which it was divided into three or four degrees of elaboration, the highest degrees of richness being reserved for the temples and *mausolea*. The greatest perfection of this decoration appears to have been attained towards the close of the sixteenth century. It is this decorative perfection, this application of the arts of painting and sculpture to the constructive arts, which impart the great charm to Japanese structures—a charm

of endless variety amidst perfect harmony. From the simplest treatment in white wood, carved and tipped with metal, to the most elaborate decoration, in which panel, beam and pillar, wall and ceiling, glow in colour and gold, every degree of adornment has its well-balanced consonance and its appropriate setting. These methods of building and of ornamentation can lay special claim to rank as an important architectural style.

DETAILS OF TEMPLE BUILDINGS.

In my general description of a temple building I have, for the sake of clearness, referred but slightly to many matters of detail—which I will now take one by one—and enlarge upon. I have already explained the harmony which exists in the proportioning of all parts of Japanese building so far as centering, or horizontal subdivision is concerned. The diameter of the pillars is fixed as equal to one rafter end plus one rafter interval—or twenty-two seconds—the second being a subdivision of the intercolumniation. There appear to be, however, no rules regulating the proportioning of heights, and the length of the pillars and posts in temples and other buildings seems to be arbitrary.

Pillars and Posts.—The term pillar is here used to designate detached wooden columns, the term post, being applied to wall columns. The external pillars are sometimes square, sometimes round, and in rare cases octagonal; they are all, invariably, rounded off at the two ends (except in the Shintô style where they penetrate the ground); the lower end rests upon a flat stone, or bronze moulded base, consisting generally of a cavetto and ovolo molding, or of a cyma and ovolo. The top receives a square block of wood sometimes similar to the base reversed, or of the form which has been technically called bird's-beak molding, but generally consisting only of a square and hollow; even in the case of rounded pillars, this top cushion block is made square on plan, as it forms the starting point of the rectilinear arrangement of cornice bracketing. The bottom of the pillars, just above the stone base, receives a cast or embossed bronze shoe, with an irregularly curved upper border. The round pillars are often reeded vertically, the square being panelled with shallow panels, filled with incised diaper and over-creeping flowers or twigs. These effects are often heightened by the use of colour; but examples of polychromatic ornament on the pillars are rare, such treatment being reserved for the beams, cornices, &c. When coloured, supporting pillars are generally painted of a deep vermilion, the incised diaper giving a rich variety to the tone of the red. Some pillars and posts are completely covered with gold leaf. Stone bases and bronze caps and shoes are dispensed with in interior columns, the shaft apparently springing immediately from the wooden floor and terminating in a rounded end supporting a system of cornice bracketing. I have already referred to the ornamentation of the top portion of such internal columns, in decorated buildings.

Horizontal ties.—The ties or horizontal timbers framed between the heads of the posts or pillars, are about half the thickness of the pillars they are connected with, and of considerable depth. These timbers are usually cambered, the roof beams being invariably bent logs, with the bend placed uppermost. The system of slightly arching

the lintols in the centre to avoid the optical illusion of depression to which such beams are subject, illustrated in Greek and other trabeated styles of architecture, is well known to the Japanese; and as these lintols or ties are often of considerable span, they are decorated in accordance with this principle, so as to give them a slightly arched effect. The underside, from points some little distance from each extremity, is sunk and double chamfered with curved stop chamfers; at the same time the extremities of the upper side are rounded off downwards in a gradual curve. The flat surface of the member near each end is sunk back in a rounded cutting, the edge of the sinking being emphasized by a deeply cut channel, ending in a fine spiral or sunk stem, with deeply incised foliage and flowers. This incised ornament is often elaborated, a not uncommon device being water streaks and spray. Whereas the surfaces of pillars and posts are often covered with a diaper, this is merely in the form of an incised pattern—in no way destructive of the appearance of stability and repose; on the other hand, the ties and beams receive the most elaborate coloured diapers, in light colours or in deep colours, relieved by white and gilding. This ornamentation is applied to the faces of the ties, the undersides and chamfers being differently treated in plain colour and gilding. In place of diapers, horizontal arabesques are sometimes used as ornamentation, the ground being gilt, and the arabesques stencilled upon the surface in colour, with crests at intervals [Illustrn. lx.] The ends of these ties are morticed right through the heads of the pillars, and the mortice end on the opposite side is hidden by a piece attached, appearing like a continuation of the tie. These terminations are sometimes mere bosses, elaborately carved; in other cases they are of the same section as the tie, curved upwards and moulded in a wavy form, the surfaces being incised with spiral ornament. Bosses represent elephants' heads, lions' heads with front portion of body, dragons with front claws, tigers' heads, and sometimes bunches of flowers, or birds amid foliage, fish in conventional water, or even tortoises. Everywhere is to be noticed the intimate mixture of conventional with naturalesque or realistic forms. Ties connecting the heads of two pillars at different levels, such as are necessary in some of the covered passages and in the flanks of the porticos, are made of a graceful double curve or ogee form, rising at the top in a graceful arched curve, gradually dipping down in a concave bend, meeting the top of the lower pillar horizontally.

Doors and Gates.—The central compartments upon the entrance front of the temples and oratories are closed by means of large hinged doors opening outwards on to the outer gallery. These doors, which are heavily constructed, are sometimes of plain white or coloured wood, depending entirely for ornament upon the gilt metal work which adorns them. Sometimes they are divided into various arrangements of panels which are carved in different ways [Illustrns. liv., lxi.]. A favourite method of enriching the panels, and even the frames of doors, is to incise over the surface a diaper or some conventional cloud or wave pattern. In certain cases the diapering forms a background, from the centre of which a raised medallion of carving in high relief having a cusped border projects. Metal clasps and bosses are arranged upon the surface of the door so as to hide the connection of the stiles and rails. Such brass or bronze embellishments are often of

a very elaborate character, being stamped or chased with floral ornament, which is occasionally further emphasized by the use of a black composition in the hollows, forming a sort of "*niello*" treatment. I believe that the Japanese architects are unique in the ways and uses to which they have put metal work in construction. It is to be found in the simplest as well as in the most ornate structures, and in all parts and positions to which it can be appropriately applied. To understand these methods of employment, the native partiality, amounting almost to a passion, for the clean white grain of the "*hinoki*," or white cedar, must be borne in mind. The use of lacquering and gilding is resorted to in the gorgeous religious buildings where polychromatic decoration is employed, and a sort of distempering is often applied to common woodwork exposed to the weather. But the people prefer above all, and employ on every possible occasion, the white unpainted wood. In interiors it retains its whiteness, whilst in external positions it assumes after a time an ashen grey hue. For the former positions the bright gold or brass-coloured metal is preferred, for the latter a more sombre tone is sought by the application of black enamel in the hollows of the castings. A simple canopy of white wood fresh from the joiner's plane, but scrupulously free from knots, assumes an air of regal finish and luxury by the addition of these metal clasps to the intersections of beams, and metal caps to the ends of the rafters. A careful selection of timber will prevent the occurrence of unsightly knots, but the joints and intersections of such unpainted wood, visible from the first, must become more and more an eyesore after the shrinkage of the parts; and it may be here added in explanation, that the rapid growth of vegetation in Japan during the hot, damp season renders the proper "seasoning" of timber almost impossible. Hence the custom of hiding joints and intersections by means of a system of gnomon-shaped or cross-shaped clasps, and covering the exposed fibres of extremities with metal caps, which, hiding gaping joints and protecting from the weather at the same time, contribute considerably to the general effect and finish. A system of decoration having such a constructive *raison d'être* is naturally extended and applied in similar positions where the primary object of its use no longer exists; this being in accordance with the legitimate development of art in all its phases. Thus we find that the same metal furniture is used upon lacquered and painted shrines where, strictly speaking, it can be said to have no purpose but that of ornament.

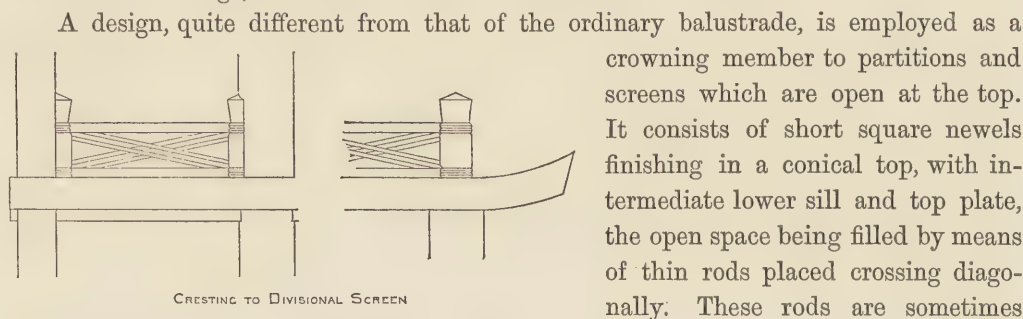
The heavy folding doors of the temples are made to turn on large pivots, and when in double folds the outer flap is hinged after the ordinary fashion. The doors of the gateways are treated in the same manner as those of the buildings, though in some cases the carving of the upper panels is pierced or replaced by ornamental trellis-work. An example of pierced carving is to be seen in the wooden gates of the Kiku-no-Mon (Chrysanthemum Gateway) of the temple of Nishi-Hongwan-ji, at Kyôto, so called from the number of chrysanthemum flowers which are so elaborately carved over different parts of its surfaces.

Doors, having their whole panel surfaces enriched with sharply incised diapers of the key pattern, cloud pattern, and water pattern, further decorated by means of raised carvings and medallions, may be seen in the mortuary chapels of Nikko, Shiba, and

and finishing in an ornamental bronze cap. This mode of treatment is consistent with the other *retroussé* forms at the eaves and ridges of the buildings, an appearance still more remarkable in Chinese and Corean architecture than in Japanese.

When such balustrades are continued, as the railing of staircases, the connection between the sloping and straight portion is cleverly made; the plates and handrails of the slanting balustrade being rounded to a horizontal direction before meeting the intermediate newel and baluster.

The small stone bridges spanning the open drains of the temple courts have often stone parapets differing very little in shape from the wooden ones described. The use of essentially ligneous forms in stone is very common. But stone parapets of a more solid form exist which have pierced and cusped panels ornamented with shallow carving. A common treatment is to have solid stone slabs below, but open work with short balusters and an open stone handrail above. A fine example of a stone parapet, treated entirely as a wooden construction, may be seen in the famous stone bridge called Megane-Bashi (*i.e.*, Spectacle Bridge). A round handrail in long pieces is employed, the sill is undercut for drainage, and the newels and balusters have the attenuated form usual in wood.



CRESTING TO DIVISIONAL SCREEN

A design, quite different from that of the ordinary balustrade, is employed as a crowning member to partitions and screens which are open at the top. It consists of short square newels finishing in a conical top, with intermediate lower sill and top plate, the open space being filled by means of thin rods placed crossing diagonally. These rods are sometimes

single and sometimes in pairs. The upper rail is often prolonged and tilted, as in the case of the handrails.

Panels.—In the most ornate structures the rectangular wall spaces left between posts and ties, when not filled with windows, slides, or doors, are decorated with framed panels—enclosing carving [Illustn. lxi.], with a raised moulded border, of some curvilinear form, ornamented with metal clasps, intended both to embellish and to hide the joints of the wood. The carvings are various, the most common subjects being birds and flowers, water and clouds, &c. In some mortuary chapels these panels are also richly coloured. In such cases the carving is executed roughly in wood, and finished with a sort of plaster putty, made of whiting, and iron filings, and size, which surface receives the colouring and gilding.

Windows.—Ornamental framed windows are generally found in the connecting passages of the temples, and sometimes in the sanctuary itself. The general form consists of a horizontal sill, from which spring jambs sloping inwards towards the top, and finishing at the crown in a curved form [Illustn. lxiii.] Invariably the form is outlined by a raised frame or border, moulded and enriched with metal, this border being sometimes fantastically embellished with scrolls or flourishes. The opening is filled with pierced

trellis work, or bars, on the outside, the inside being closed by paper slides or wooden shutters. In decorated buildings the raised border is lacquered, and the metal clasps, as well as the pierced trellis work, are gilt.

Oriel windows are found in the monastic buildings, and form a pleasing feature of the rooms. The recessed bay projects generally upon the verandah, having a separate low roof. The lower portion has square or curved openings, fitted on the interior with slides, and above these openings are generally oblong frieze panels filled with pierced carvings, or elaborately pierced diapers. In such positions, circular openings are not uncommon, but the slides which are placed in grooved frames on the interior, are invariably square in form.

ACCESSORY TEMPLE BUILDINGS.

Gateways.—The Japanese builders revel in gateways. Scarcely a temple of importance exists, which has not several gateways of different form and design, with some special name, either referring to its form of roof, or to the motives of its principal carving. The secondary gateways are generally one storeyed, and consist of a single opening, with heavy doubled doors, panelled, carved, and latticed at the top. The flanks of such gateways receive heavy wood carvings between the supporting pillars. The constructive treatment of columns, cornice, eaves, and gable, is the same as already described in referring to the temples themselves [Illustrn. lxi.]

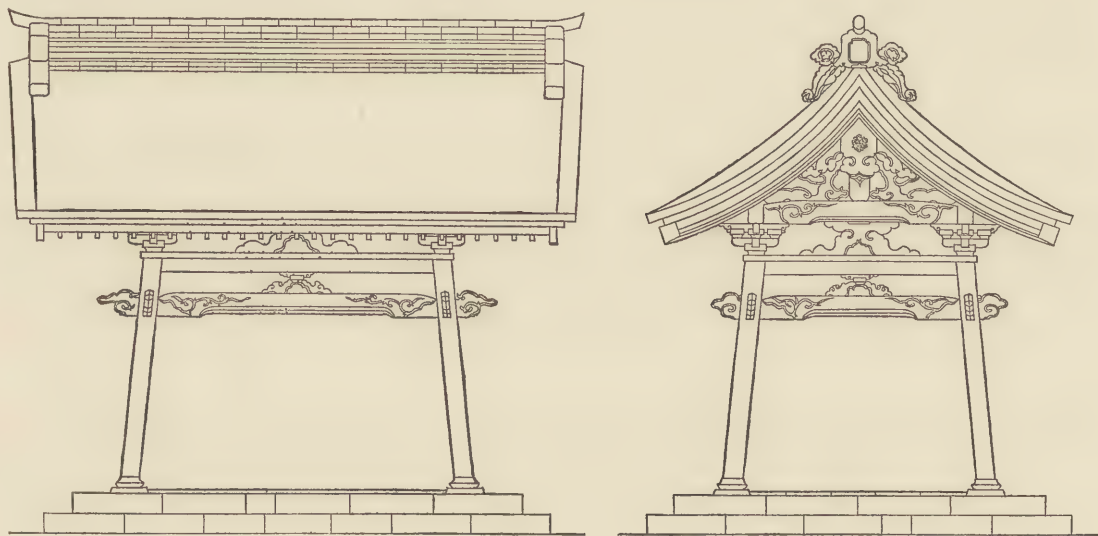
In front of the principal temple building, or *Honden*, there is generally a large outer gateway, which is often of great size, and of heavy construction—placed at the entrance of the enclosure proper, there being often an open paved approach external to this, which is spanned by a stone or bronze *Tori-i*.

Generally this main gateway is two storeyed, the lower portion forming the entrance, with one wide central passage, and two side openings, railed off—containing statues or images in wood or stone—the form assumed differing according to the particular sect to which the temple belongs.

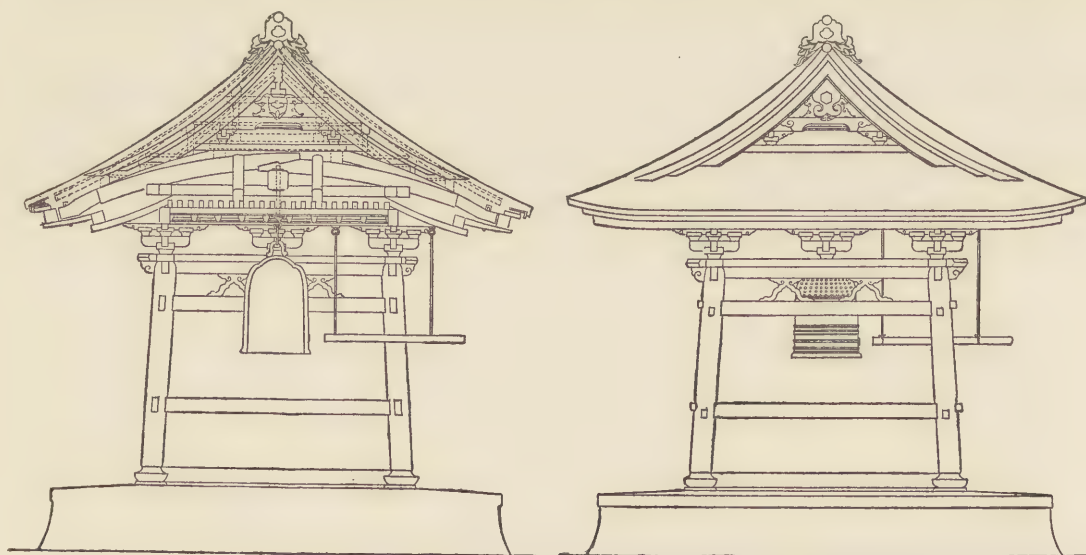
The upper portion of the gateway is used as a chapel or muniment room, reached by a ladder-like staircase. The largest example of such two storeyed gateways, is at Chion-in, at Kyôto, the upper chamber, which is elaborately decorated, containing a row of seated wooden images of the sixteen disciples of Buddha.

Font Sheds.—The font shed covers a large granite or bronze water basin, employed for ablutions before worshipping [see diagrams on the next page.] The pillars of such constructions generally slope inwards towards the top, and are held together by the usual horizontal braces, apparently intersecting the columns, beyond which they are produced in the form of carved projections. The roofs are mostly curved and gabled—the curve being sometimes concave and sometimes convex. The system of ornamentation followed in the cornice and gable ends, differs but little from that employed in the temples themselves. The inside generally has a rich panelled ceiling, carved and coloured, and carvings of flowers and birds, dragons and clouds, are lavishly disposed in various parts of

the upper portion of the structure. The basins which these font sheds cover are generally of an oblong shape—widening towards the top—and hollowed out in a cusped form at the base. Bronze is a favourite material for such basins, and the delicacy and sharpness of the reliefs cast upon their surface is unsurpassed by any metal work in the world.



Belfries.—Open sheds very similar to the font sheds are used to shelter the large bronze bells which many temples possess [see diagrams below]. The inclined pillars are



generally tied near the bottom with an extra horizontal tie, and the beams of the ceiling are of great thickness to support the weight of the bell.

Drum Towers.—Another detached building commonly to be found in the temple courts is the drum tower, which is a building for holding the large drums struck upon certain religious occasions. These cylindrical drums, of a diameter of 4 or 5 feet, are supported upon carved wooden stands, placed in the centre of a large chamber forming the upper storey of the tower. The lower storey, in which the ladder-like staircase is placed, is boarded upon the outside, so as to present a concave battering base, with no openings but the entrance door.

PAGODAS.

The Japanese pagodas are mostly five-storeyed wooden towers, erected among the trees of the temple grounds; though there are many examples of pagodas of two and three storeys [Illustn. lxii.]. The lower storey sometimes contains shrines or wooden images, but the upper stages serve no purpose but that of a belvedere. They are by no means found attached to all temples, only the more important temples of the larger cities possessing them. It appears that in former times they existed in much greater numbers, and were erected all over the country on the occasion of the first adoption of the Buddhist faith by the ancient emperors. Though the timbers employed are of immense size, these towers do not seem to have survived for any great period. There is one rather doubtful example of a very early pagoda at Nara, said to date from the eighth century. In hundreds of places there are marks where pagodas have stood, but those now standing date mostly from the seventeenth century. They average one hundred and fifty feet high from the ground to the finial point, and form prominent and picturesque landmarks, being in fact the only Japanese buildings which have height sufficient to assert themselves to any great distance. The plan of these buildings is about twenty-four feet square at the base, and each of the upper four storeys recedes somewhat from that below it, each set-off having a curved lean-to roof of considerable projection with a rich bracketed cornice below. The top is crowned by a curved pyramidal roof with a bronze finial of large size and great height. The tilted corners of the eaves carry small bronze bells and dangles. The cornices and soffits of the eaves are most elaborately framed and carved, and below the bracketed cornices are small openings communicating with the balustraded balconies. The lower storey has generally, in the panels of the frieze, representations of the twelve signs of the zodiac according to the Chinese arrangement. The construction is of very heavy timbers, framed and braced upon the inside in such a complicated manner that there is hardly room for the ladder-like staircases which lead from stage to stage. A central post about three feet in diameter at the bottom and diminishing towards the top is framed into the apex of the structure, resting upon a central stone block at the bottom. This is intended to stiffen the tower against swaying in the wind, and the length is so calculated that after the various stages of the tower have shrunk and settled, the central post shall just bear upon its stone base. The builder makes an allowance for this in fixing the length of his spinal column, or in some cases cuts several inches off its extremity after fixing, and there are instances of miscalculation in which it is still an inch or two from its bearing and consequently strictly speaking suspended from the top.

It is easy to imagine the injury and derangement which would be caused in the structure by a continuous central stiffening piece designed originally of the full combined height of the different stages of the tower, before they had taken their final settlement. It is therefore more natural to find that the pole has been made too short than too long. Some pagodas have no continuous central post, but only a short piece framed into the top roof for the purpose of fixing the heavy bronze capping and finial to. Although these Japanese towers are all square in plan, and with rare exceptions of the same number of storeys, and have all the same number of projecting roofs, and galleries, a comparison of several of them will show a considerable difference in their proportions. Some are more graceful than others. As a general rule the lower the different stages are in proportion to their width, the flatter is the curve of the roof and the greater the projection of the eaves. The bronze finial alluded to generally consists of a central standard supporting nine thick horizontal rings, and finishing in a ball or knot at the top; the standard rests upon a broad circular bronze pedestal forming a cap for the apex of the roof against which the four lines of hip-cresting abut. The large oversailing eaves of each storey, seen mostly almost vertically from below, render the soffits of these projections important surfaces for the grotesque and effective carving and colouring peculiar to the religious buildings of the country. Dragons and cloud patterns are often lavishly carved in such positions, and the orthodox corbelled bracketing carries numerous gargoyle-like projections representing grotesque heads of sacred or symbolical animals [Illustrn. lxii.].

These buildings, and others previously mentioned, together with houses of resident priests, covered passages connecting them in some cases with the main building, stone and bronze lanterns, and stone monuments of various form, constitute the chief auxiliary structures of the ordinary temples [Illustrn. lxiii.]

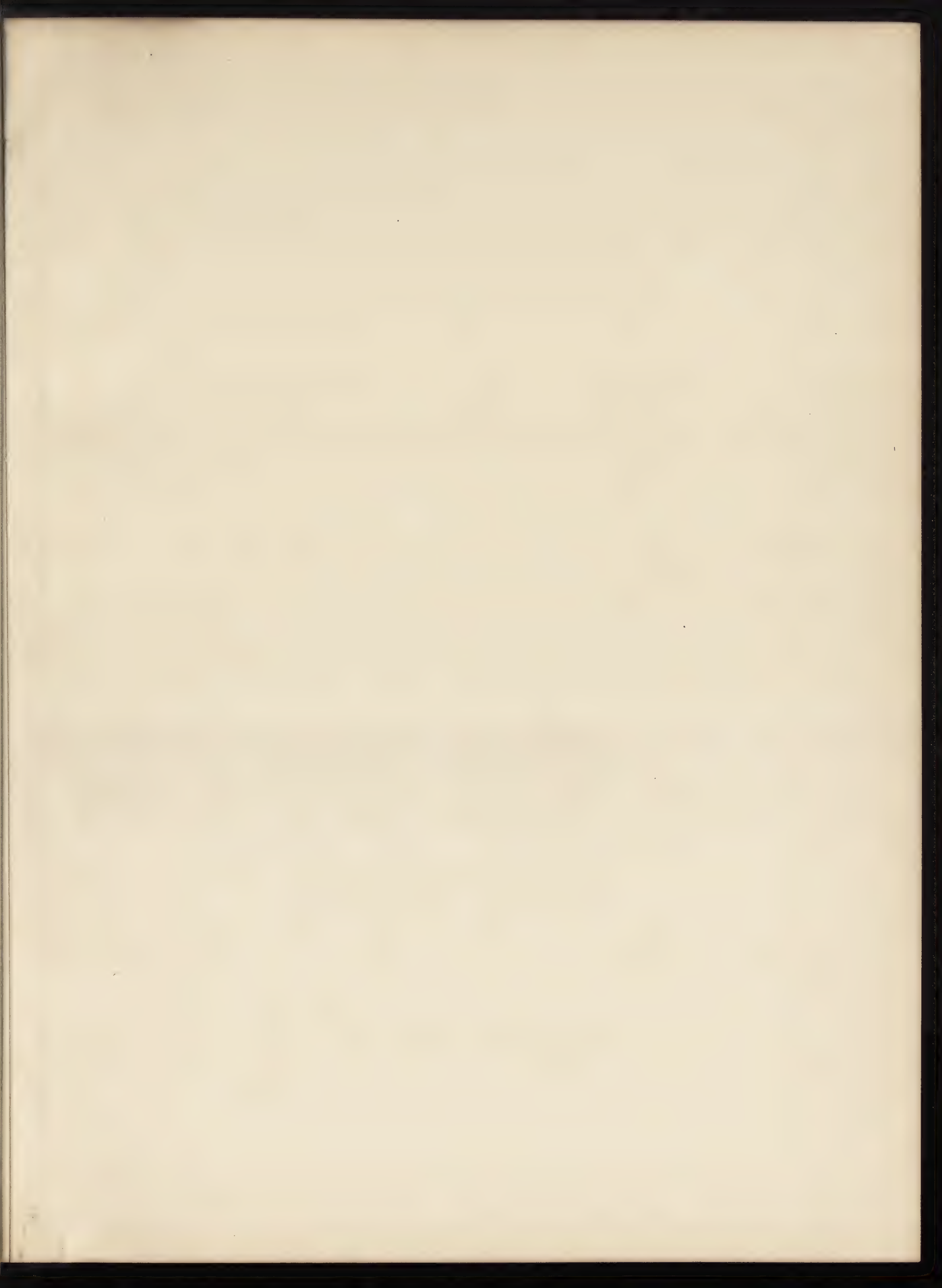
BISHOPS' PALACES.

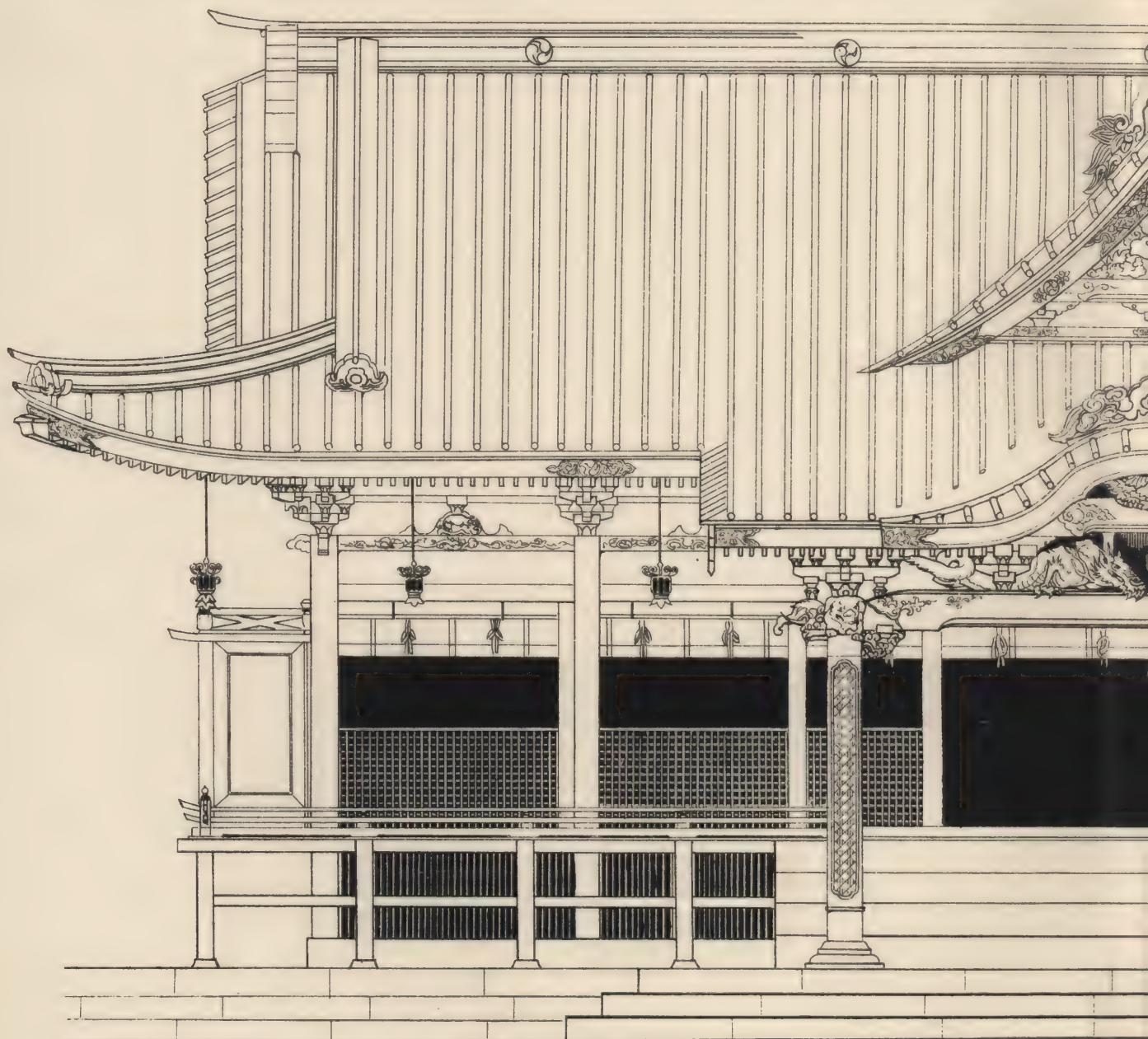
The ordinary priests' residences, attached to the religious buildings, differ but little from the usual domestic dwellings, but the principal central establishments of the sects contain conventual buildings for the chief priests or bishops, which attain to a certain amount of magnificence, and may be well described under the title of Bishops' Palaces. The arrangement consists of a large porchway and entrance hall, connected with the principal suite of apartments by a wide side-corridor, flanked by waiting rooms; the chief rooms being arranged upon two sides of an inner court or garden, the opposite sides of which are occupied by the offices. Perhaps the best and most typical example of such buildings is to be found in connection with the central temple of the Shinshu Monto sect at Kyôto, called Nishi Hongwan-ji. There is a similar one at the central temple of the Jodô sect, called Chion-in, at Kyôto.

In the Bishop's Palace of Nishi Hongwan, we find all the refinement and luxury of papal magnificence rather than the simplicity of cloistered asceticism. The principal rooms of the palace were reconstructed here after the death of Taikosama, having been removed from Momoyama at Fushimi, where they had formed the favourite resort of that

prince. The principal of these are the large pillared reception hall (*O-hiroma*) and the adjoining suite of rooms, which increase in richness towards the daïs-chamber, or *jodan no ma*. The reception hall, which is intended for special assemblies, is furnished with a raised daïs, separated from the main portion by a row of columns partly filled in with gracefully cusped tracery and pierced wooden panels. The wall at the back of this daïs is provided with the heavy lacquered slides, shelves, and handsome recesses peculiar to a high-class room, and on the plaster walls above are large figure paintings from Chinese history, on a gold background. The gilt slides which fill in the remaining sides are decorated with paintings, the subject of which is the stork and pine-tree in varied combinations. The adjoining chambers are called the *Shiro-jo-in*, on account of the light and brilliant tone of the decoration adopted. A decided preponderance of gilding, combined with cream-coloured grounds and brown lacquered furnishings, produces a general effect of amber, brown, and gold. Here and there a sprinkling of bright colour in the drapery of the figures, or of patches of blue and emerald in the landscapes, relieves the sunny warmth of the general tone. Of these three rooms, the daïs-chamber is the most gorgeous, being filled with lacquered shelves, picture recesses, a trellised oriel, and handsome slides hung with silk tassels which open on the daïs for the entrance of the greatest dignitaries. Into this *jodan no ma* it is said that none but men of high rank were admitted, inferior supplicants or messengers taking their position in the adjoining or further chamber according to their importance. In pursuance of this custom, it often happened that a visitor of low rank was compelled to address the seated magnate from a distance of some thirty feet, and at a level lower by two steps, the floor of each room being raised one step above the next. These secondary apartments, decorated in similar character, have each different subjects of embellishment taken from Nature's store of flower and plumage. The divisional pillars and lintels, between which, when circumstances require, painted slides are inserted, are filled in permanently towards the top with carved and trellised panels, called *ramma*, used for ventilation. Such *ramma* form perhaps one of the most ornamental features of Japanese buildings. Some are designed in open arabesques or diapers, and some of pierced carving with endless variety of form and motive [Illustn. lix.] Hanging bunches of *wisteria* twining amid dainty lattice-work, flying pheasants in a labyrinth of leaves, wild geese soaring through conventional cloud-patterns, are but a few of the subjects to be noted in the bishop's palace of Nishi Hongwan.³⁷ These pierced carvings are mostly wrought in high relief, and worked so as to be viewed from either side. A small sacristy or robing room adjoins these apartments, equalling them in the elegance of its furnishings and paintings, and having the further charm of minuteness. The sensational charm of the diminutive in size is a source from which many literatures have drawn and to which we owe the attraction of fairy tales and many pretty stories. The Japanese, however, alone seem to have adopted it as a principle of architectural design—as a means of pleasing architectural effect. For other nations the great idea has been to obtain surpassing size—the sensation of

³⁷ A sacred dancing stage pertaining to this palace is shown in Illustn. lxiv., and a similar dancing stage at Nikko is described in the Appendix, p. 212.—R. T. C.

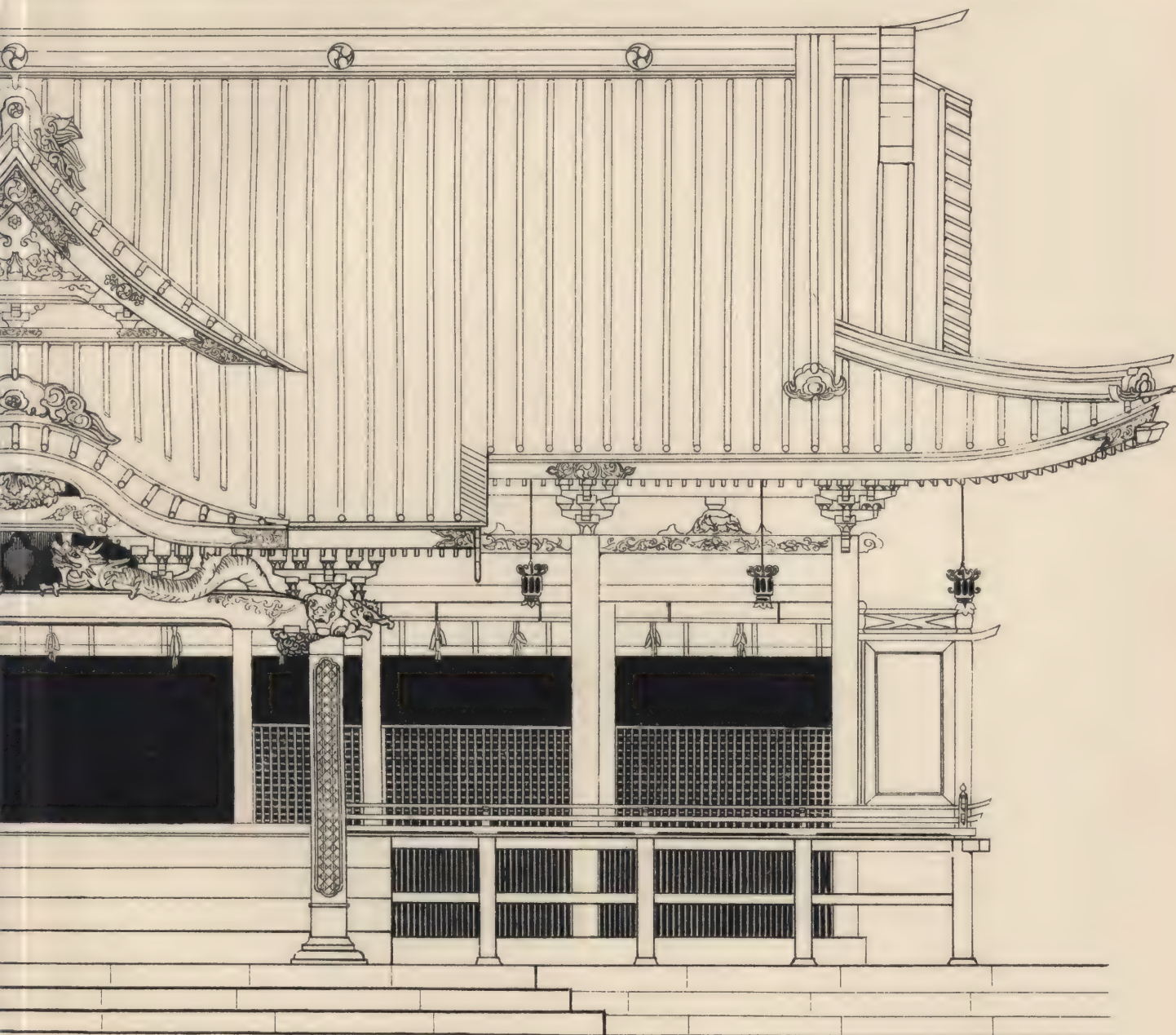




R.T. Conder del. for lith.

Scale of 10 5 0

TEMPLE OF MIYŌ-JIN, KAN

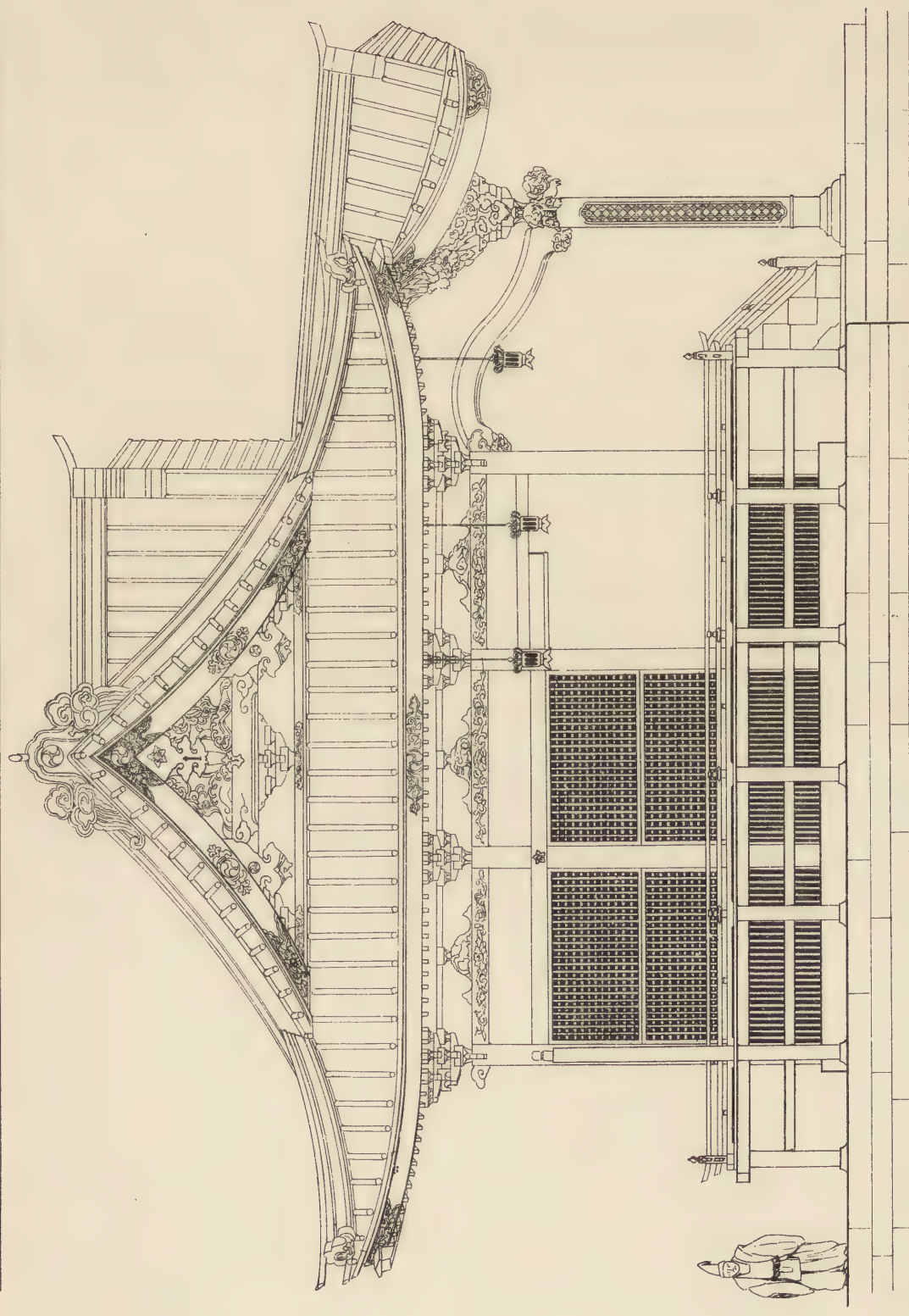


C. F. Kell, Photographer, London, E. C.

10 20 30 English Feet.

DA, TÔKYÔ: FRONT ELEVATION.





R.T. Conder, del. for lith.

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5 0

10

20

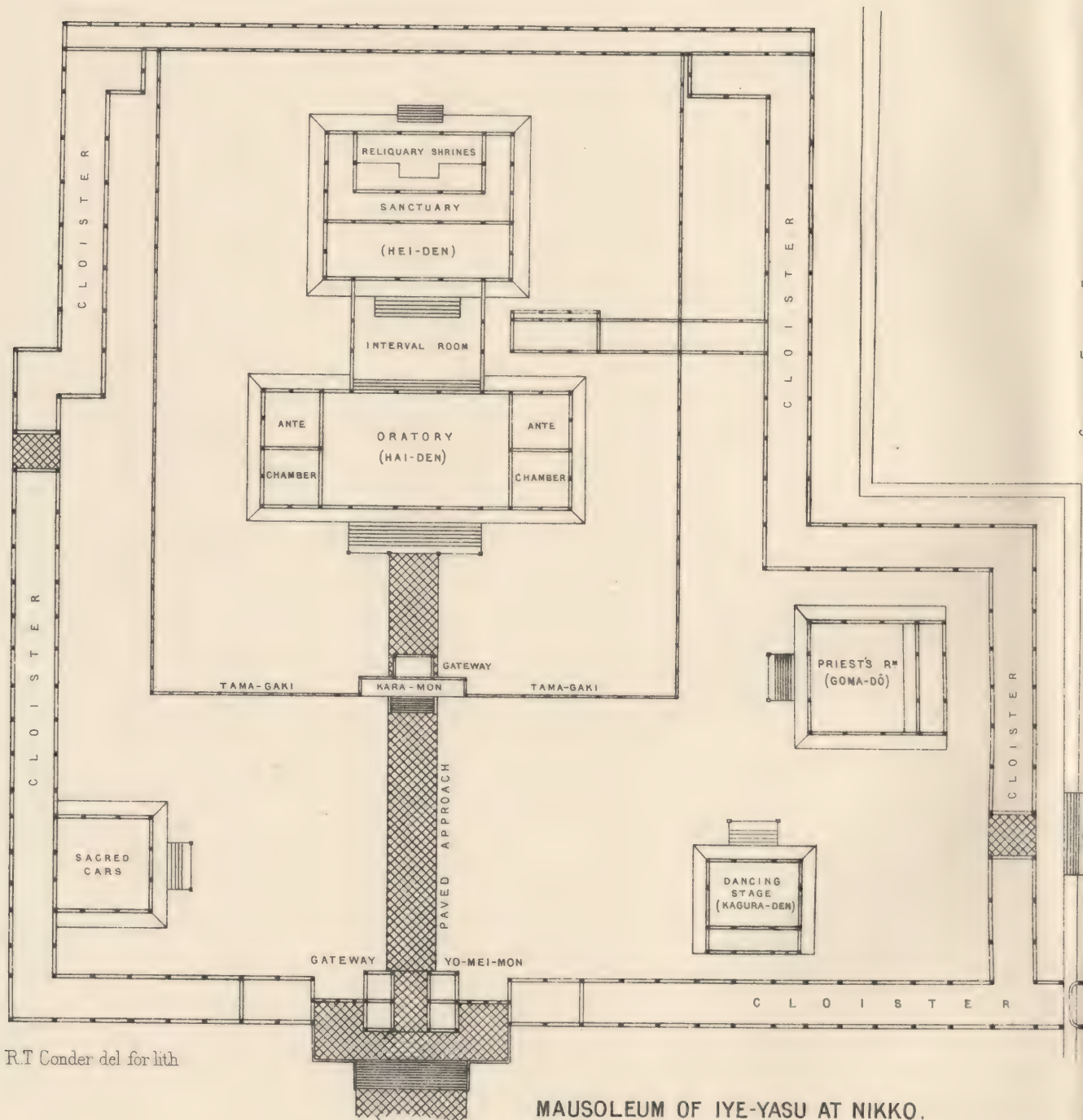
30 English Feet

C.F. Kell, Photo-Litho, Castle St. Holborn, London, E.C.

TEMPLE OF MIYO-JIN, KANDA, TÔKYÔ: SIDE ELEVATION.







R.T. Conder del for lith

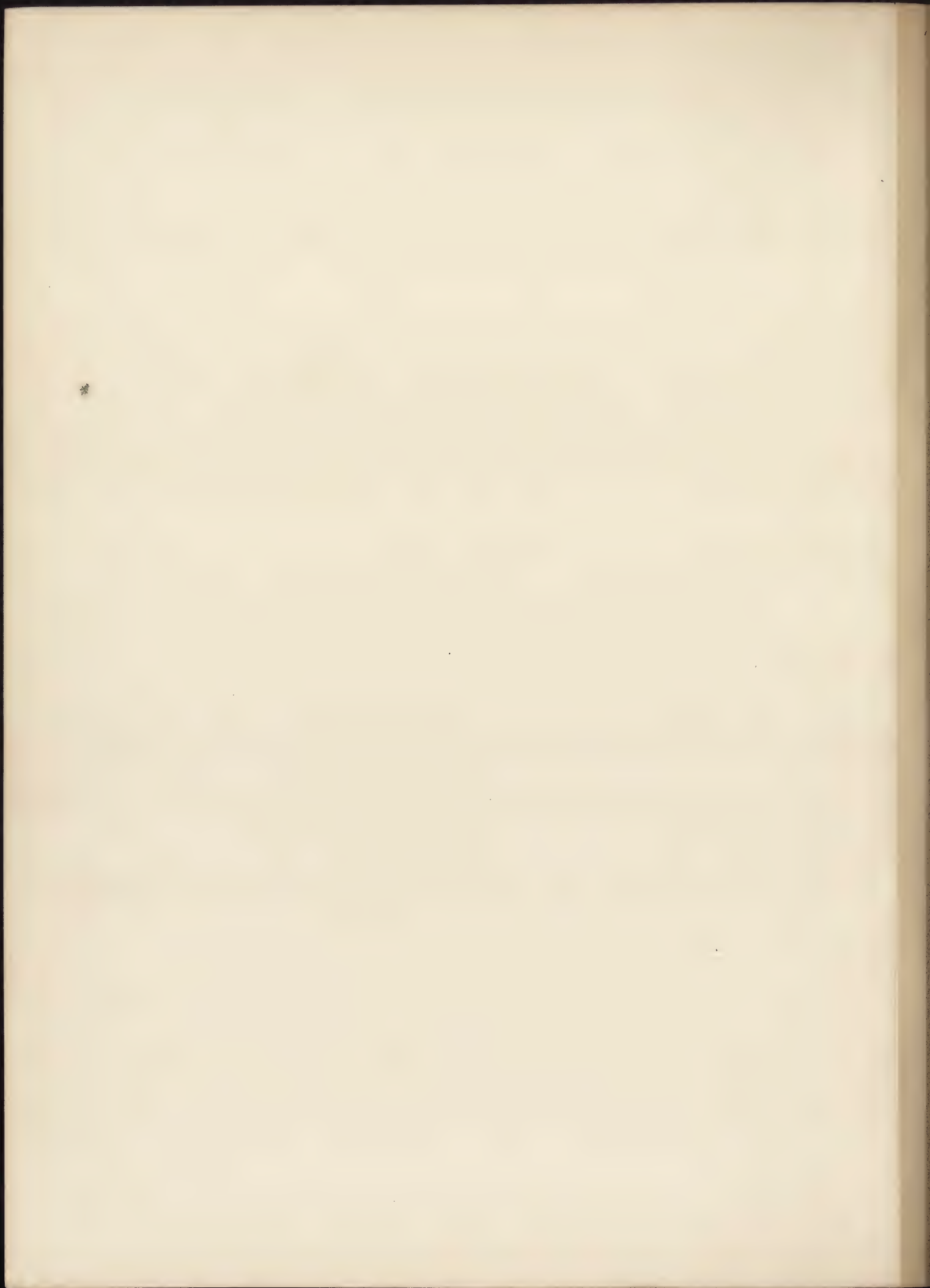
MAUSOLEUM OF IYE-YASU AT NIKKO.
ENLARGED PLAN OF PRINCIPAL ENCLOSURE AND MORTUARY CHAPEL.

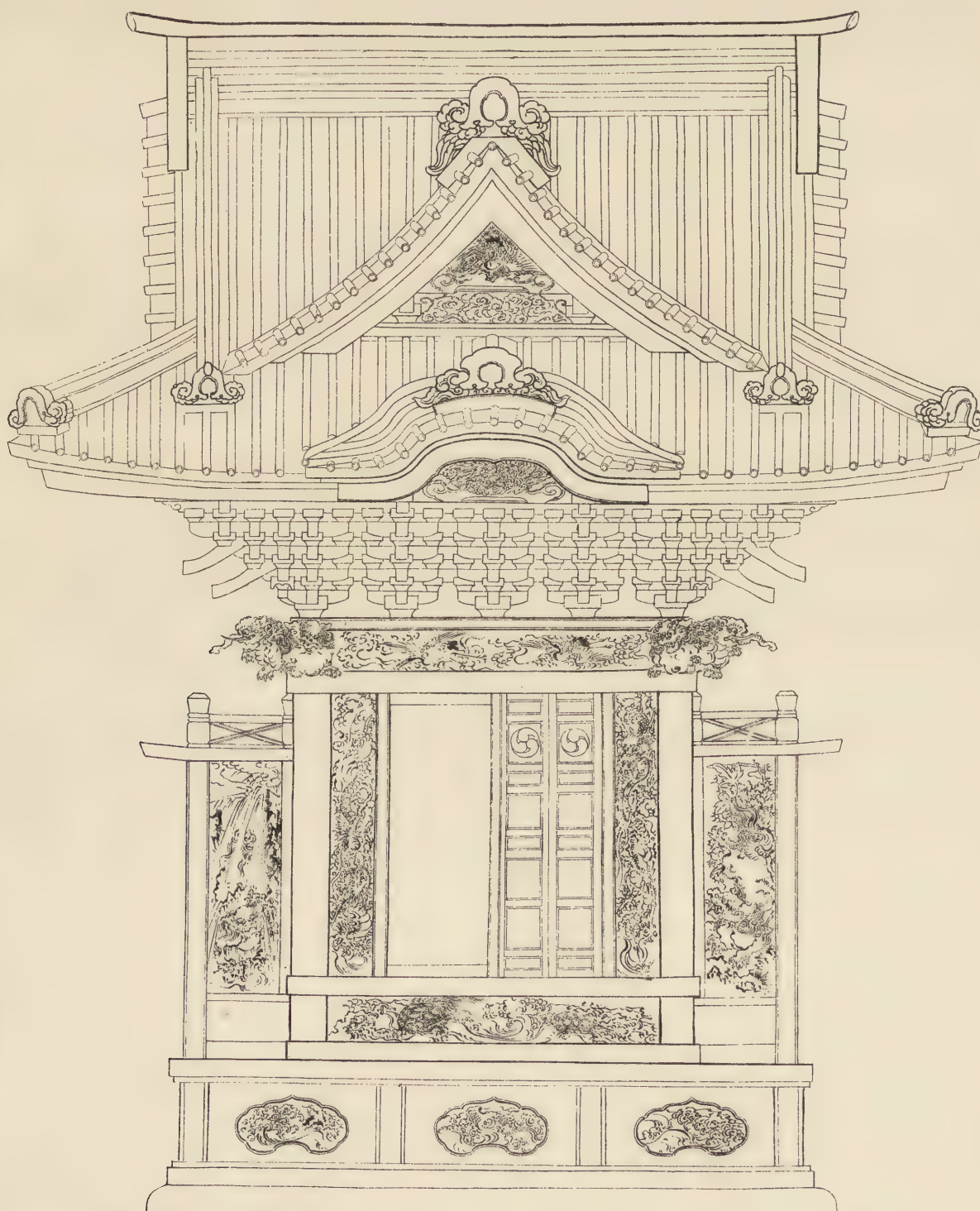
REFERENCES TO BLOCK PLAN.

1. Granite Tori-i.
2. 5-storeyed Pagoda.
3. Gateway (Ni-o-mon).
4. Sacred Stable.
5. Lower Store House.
6. Middle Store House.
7. Upper Store House.
8. Water Shed (On-chodzu-ya).
9. Bronze Tori-i.
10. Library (Kio-zo).
11. Lamp Sheds.
12. Drum Tower.
13. Belfry.
14. Priests' Residence.
15. Gateway (Yo-mei-mon).
16. Cloister.
17. Dancing Stage.
18. Priests' Room.
19. Contains sacred Cars.
20. Gateway (Kara-mon).
21. Oratory (Hai-den).
22. Interval Room.
23. Sanctuary (Hon-den).
24. Gateway (Kokaku-mon).
25. Steps up to Tomb.
26. Highwooded Ground.
27. Upper Mortuary Chapel.
28. Monument.



MAUSOLEUM OF IYE-YASU AT NIKKO. GENERAL BLOCK PLAN.





Scale of 12" 9" 6" 3" 0"

1'

2'

3'

4'

C. F. Kell Photo-Architect London, E.C.
English Feet.

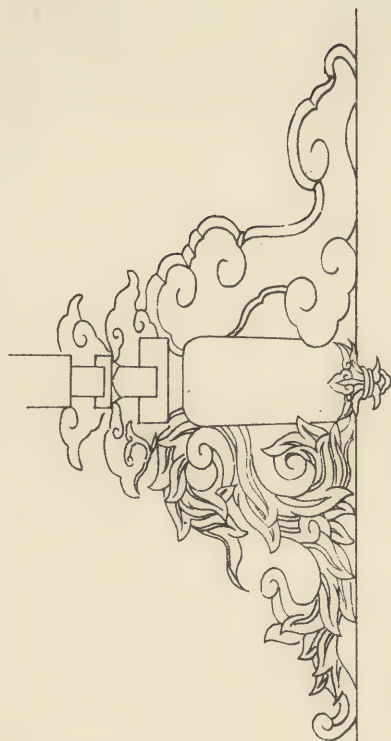
ALTAR SHRINE, TEMPLE OF MIYO-JIN. AKAGI

REDUCED FROM A JAPANESE DRAWING.





EXAMPLES OF FROG-LEG SUPPORTS TO BEAMS (KAERU-MATA).



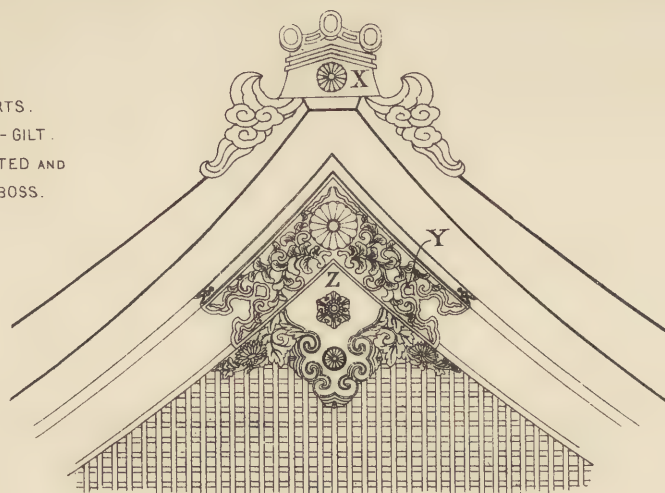
R.T. Conder del. for lith.



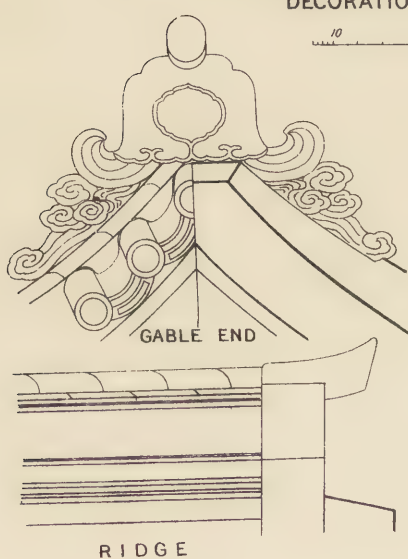
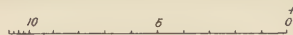
C.F. Kell Photo-litho. London. E.C.



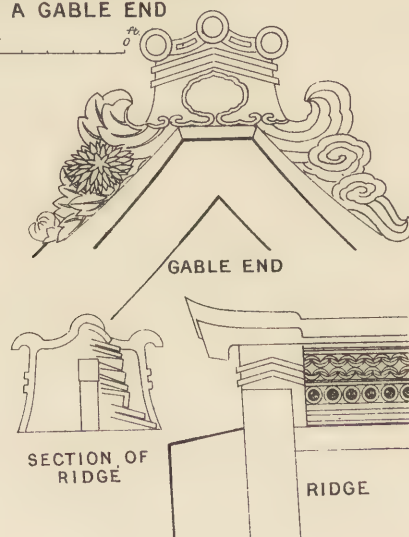
X IS COPPER - GILT IN PARTS.
Y IS REPOUSSE' BRONZE - GILT.
Z IS CARVED WOOD PAINTED AND
GILT - WITH GILT METAL BOSS.



DECORATION OF A GABLE END



RIDGE



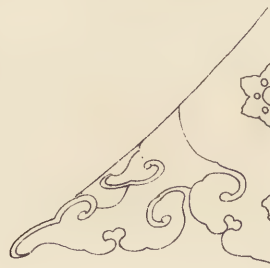
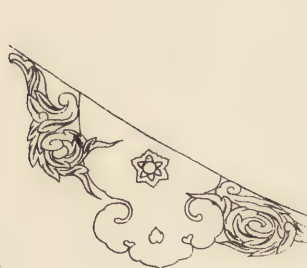
GABLE END

SECTION OF
RIDGE

RIDGE



PENDENTIVES



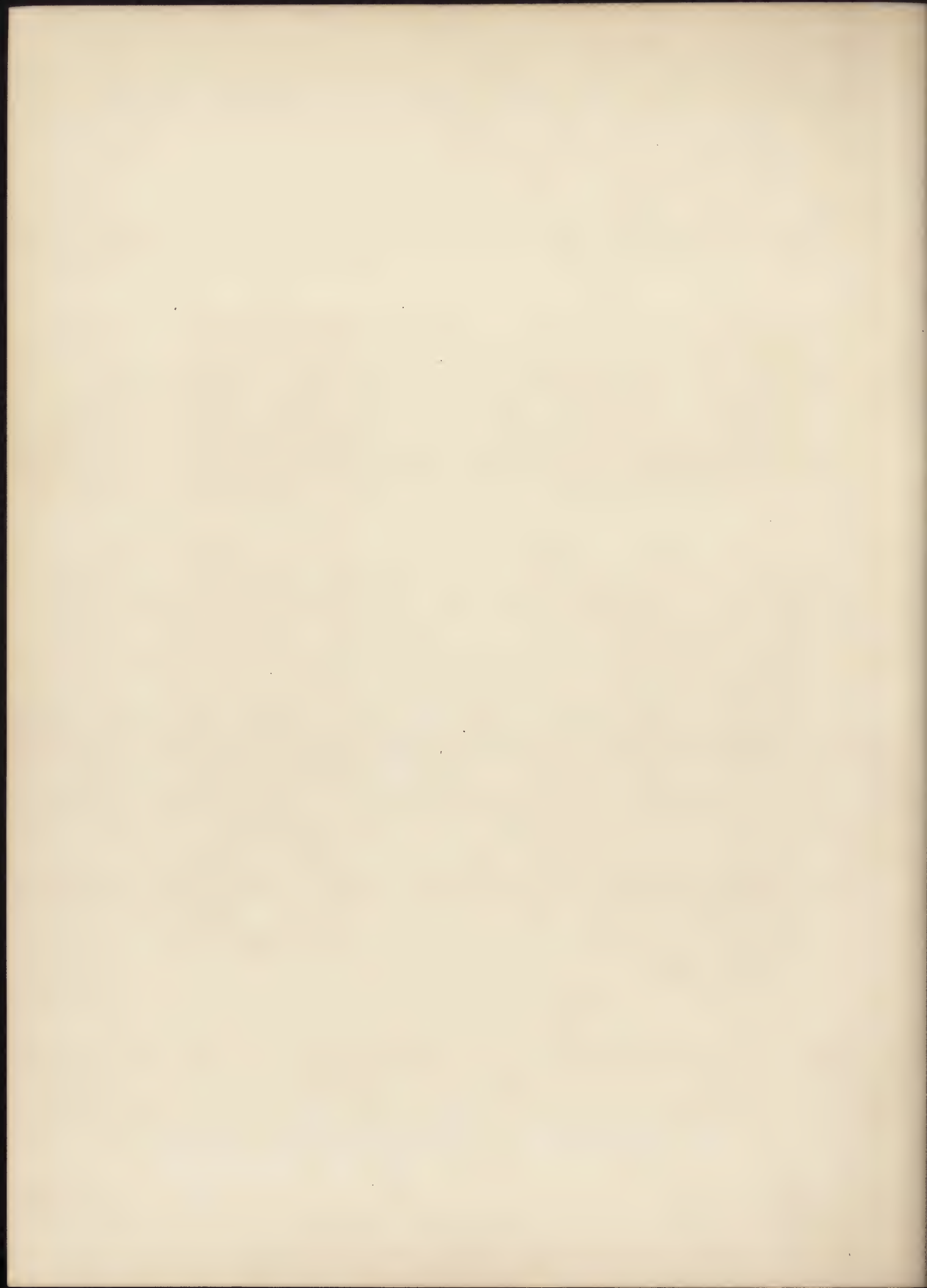




R T Conder del, for lith.

C F Bell Photo-Litho London F C

EXAMPLES OF SURFACE DECORATION: DRAGONS AMID CLOUDS.





Yellow Lion
Red Ground
Yellow Lure

White pattern on
Dark Red Ground.
Light Blue



EXAMPLES OF THE DECORATION OF THE TOPS OF WOODEN COLUMNS
IN IMITATION OF EMBROIDERY HANGINGS (GO-HEI).



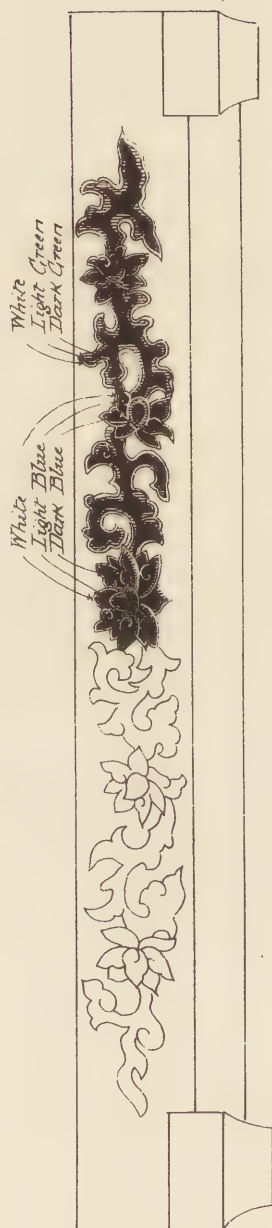
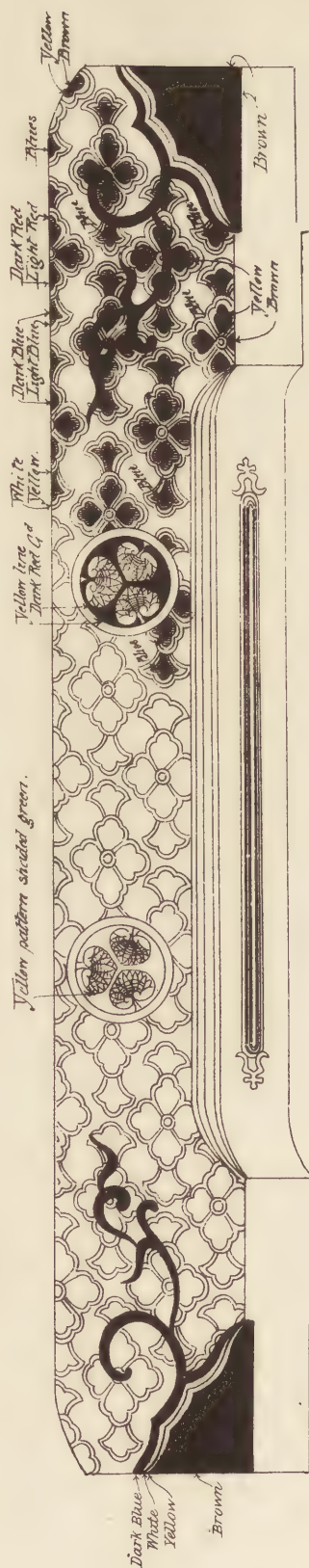


CARVED, PIERCED, AND PAINTED WOODEN PANELS (RAMMA).



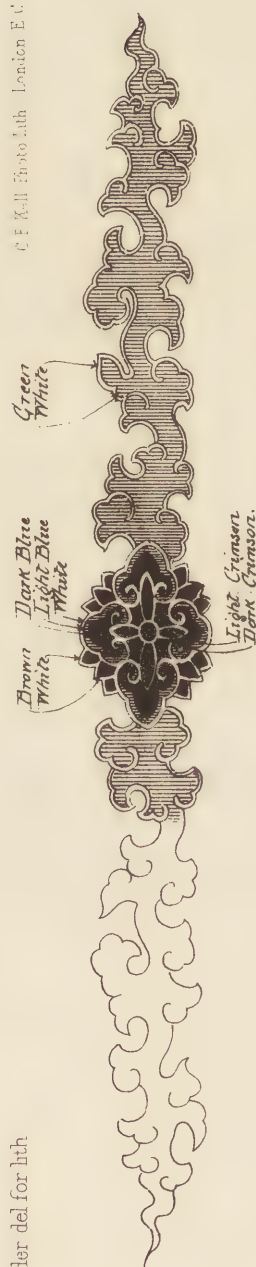
R.T. Conder del. for lith





R.T. Comder del for lith

C.F. Hall Photo Lith London E.C.



EXAMPLES OF THE DECORATION OF WOODEN BEAMS.





TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL. II. NEW SERIES
XXI. FURTHER NOTES ON JAPANESE ARCHITECTURE (ixi).

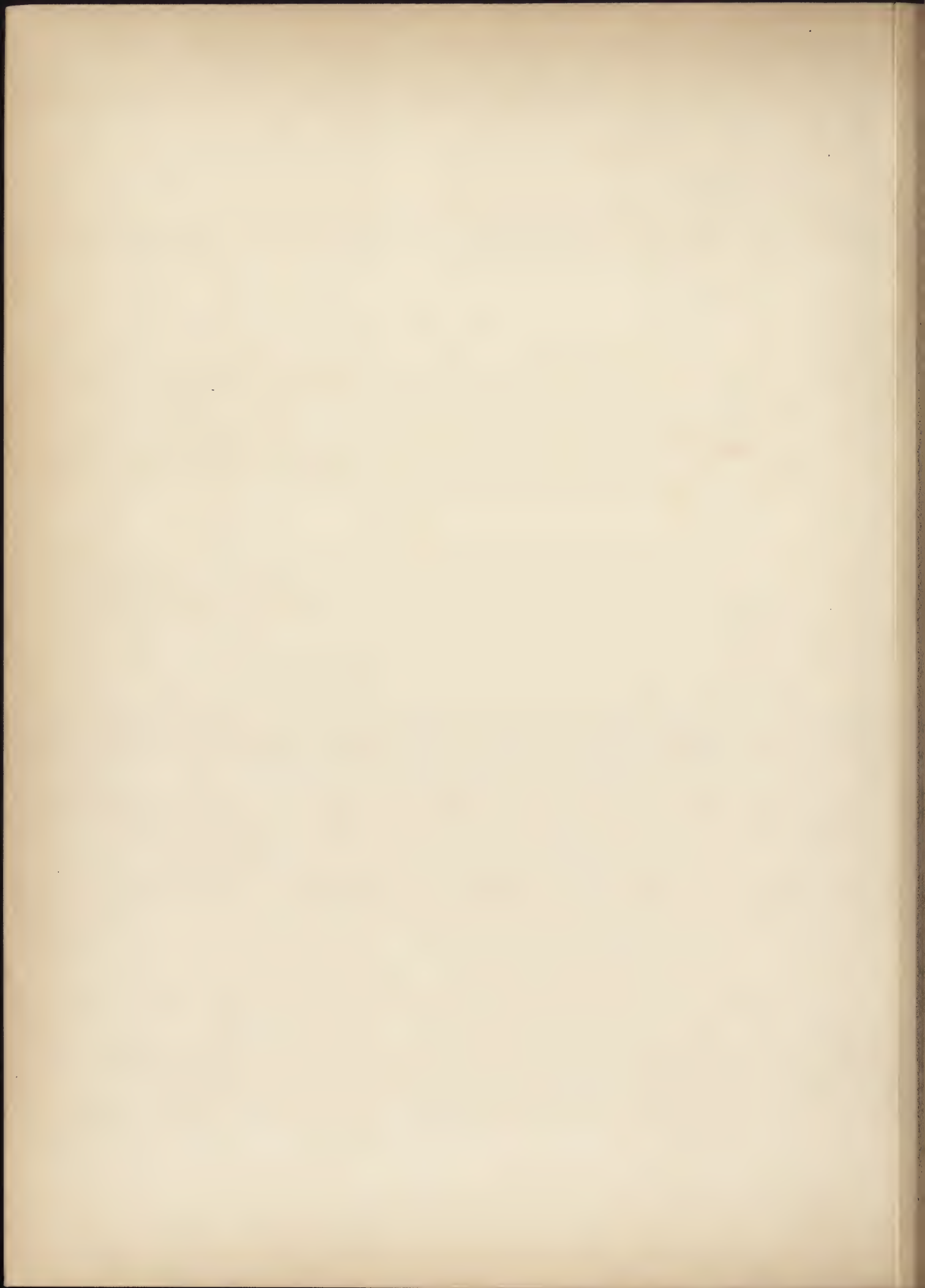


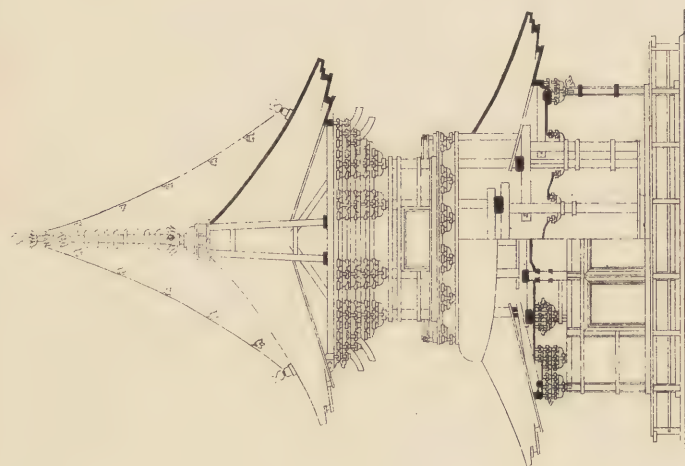


FROM A PHOTOGRAPH.

THE PHOTOTYPE COMPANY, 303, STRAND, LONDON.

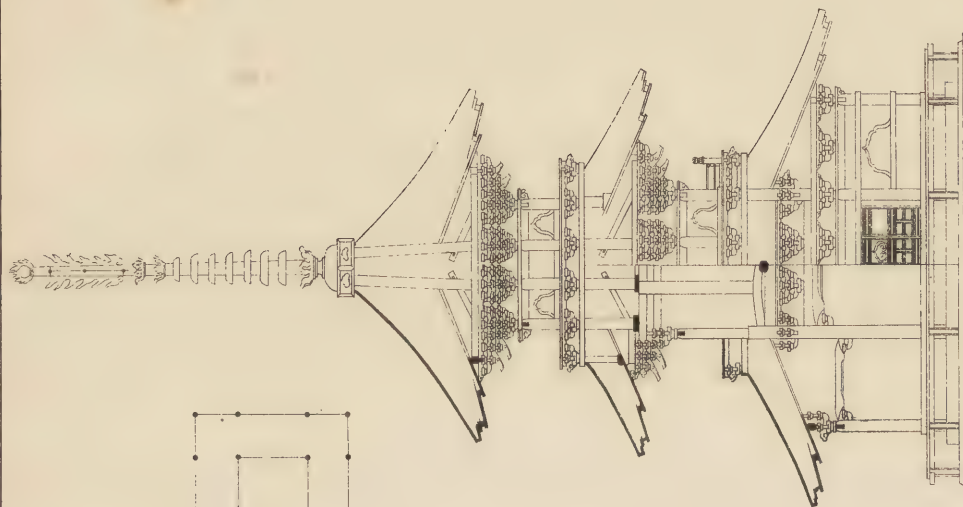
GATEWAY AND WOODEN SCREEN-WALL BEFORE MORTUARY CHAPEL, SHIBA, TÔKYÔ.





DAI - TO

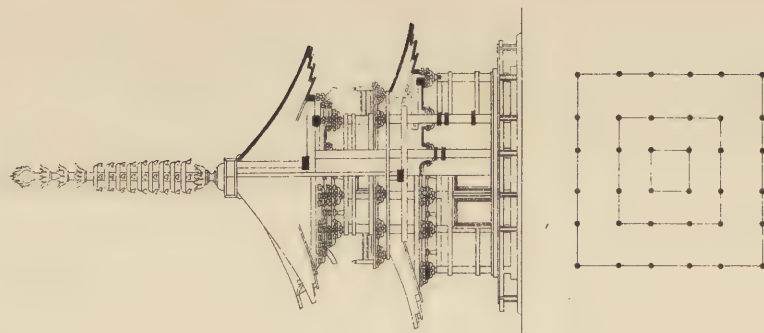
LARGE TWO-STOREY PAGODA



HO - KIN - TO

THREE - STOREY PAGODA

FROM JAPANESE DRAWINGS.



SHO - TO

SMALL TWO-STOREY PAGODA

C.F. Kell, Photo-Litho. Castle St. Holborn, London, E.C.





TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL. II. NEW SERIES.
XXI. FURTHER NOTES ON JAPANESE ARCHITECTURE (ixiii).



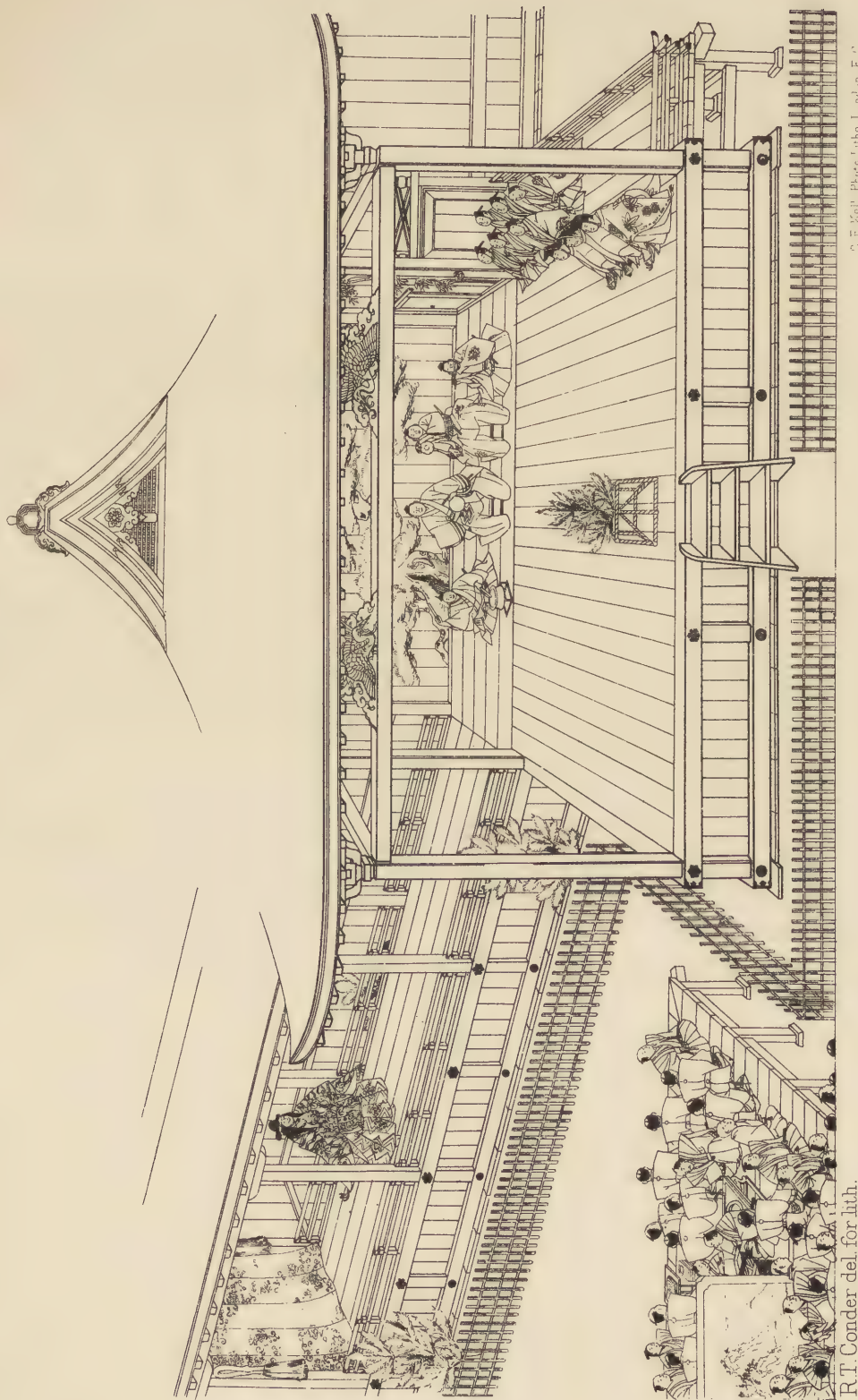


FROM A PHOTOGRAPH.

THE PHOTOTYPE COMPANY, 303, STRAND, LONDON.

FAMOUS PAGODA CALLED TENNO-JI, AT OSAKA.

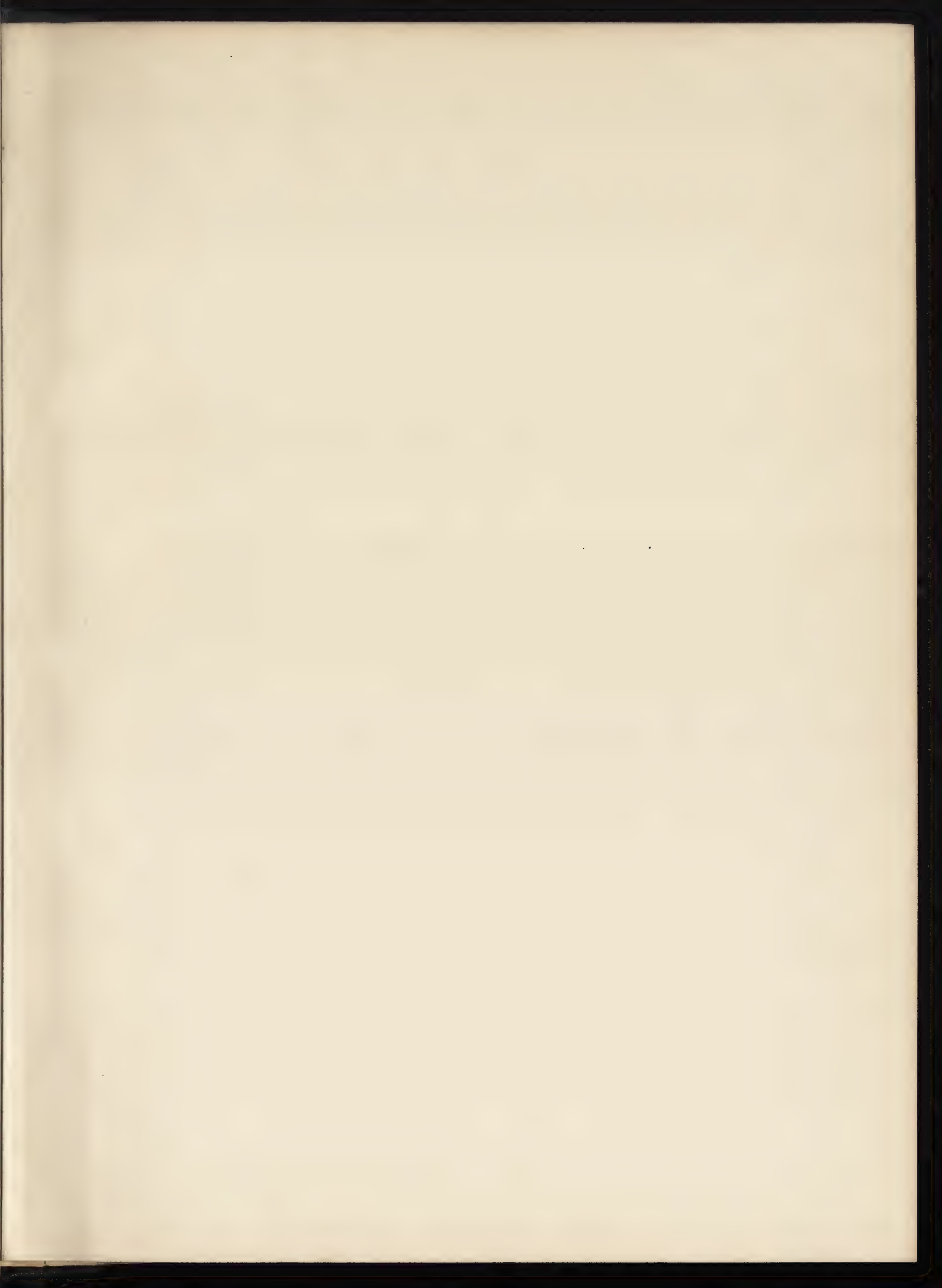




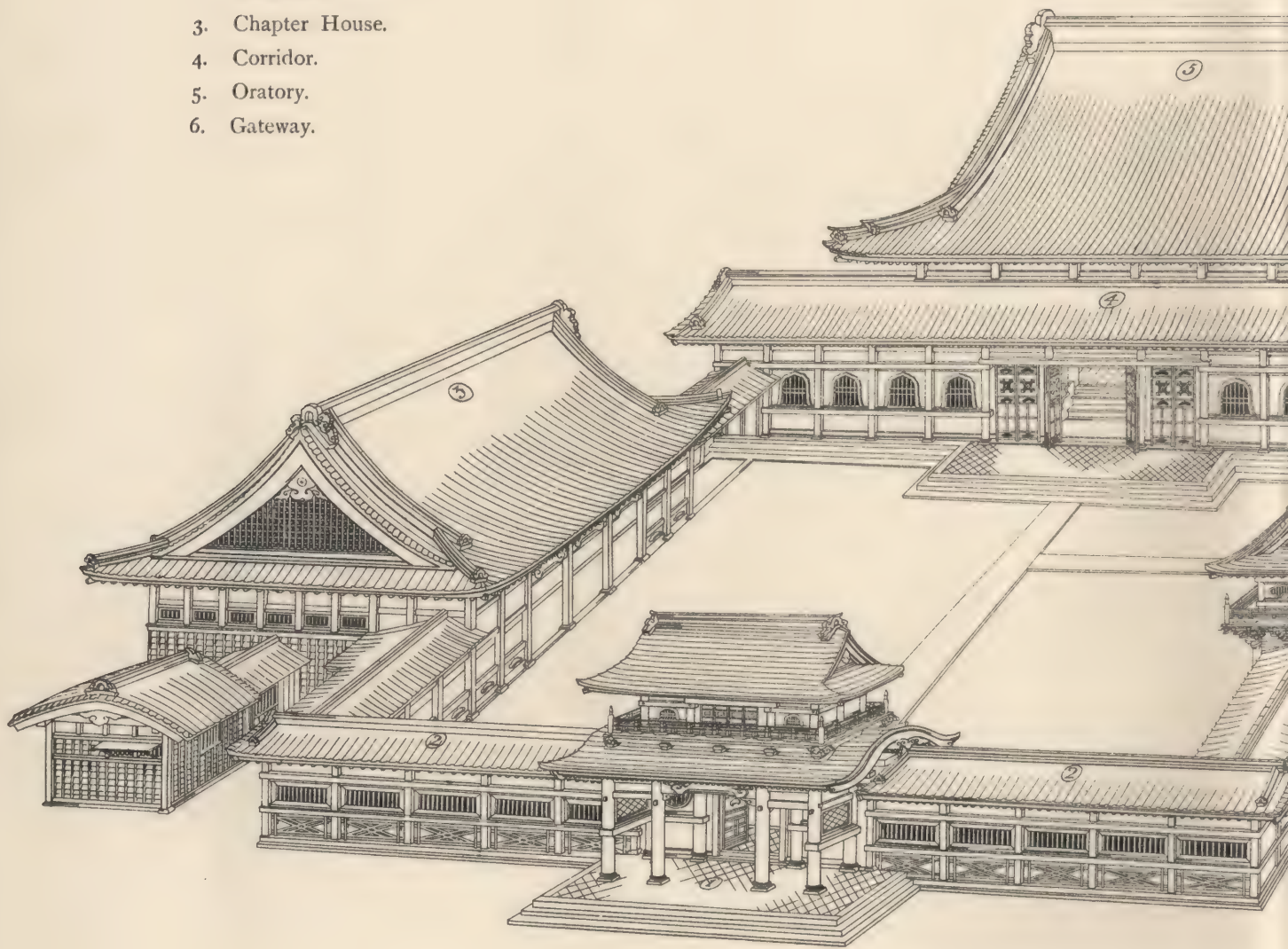
C. F. Meil. Photo Litho London E.C.

BUILDING FOR SACRED DANCES ATTACHED TO THE BISHOP'S PALACE, NISHI HONGWAN-JI, KYÔTÔ.
FROM A JAPANESE SILK PAINTING





1. Entrance Gateway.
2. Corridor.
3. Chapter House.
4. Corridor.
5. Oratory.
6. Gateway.

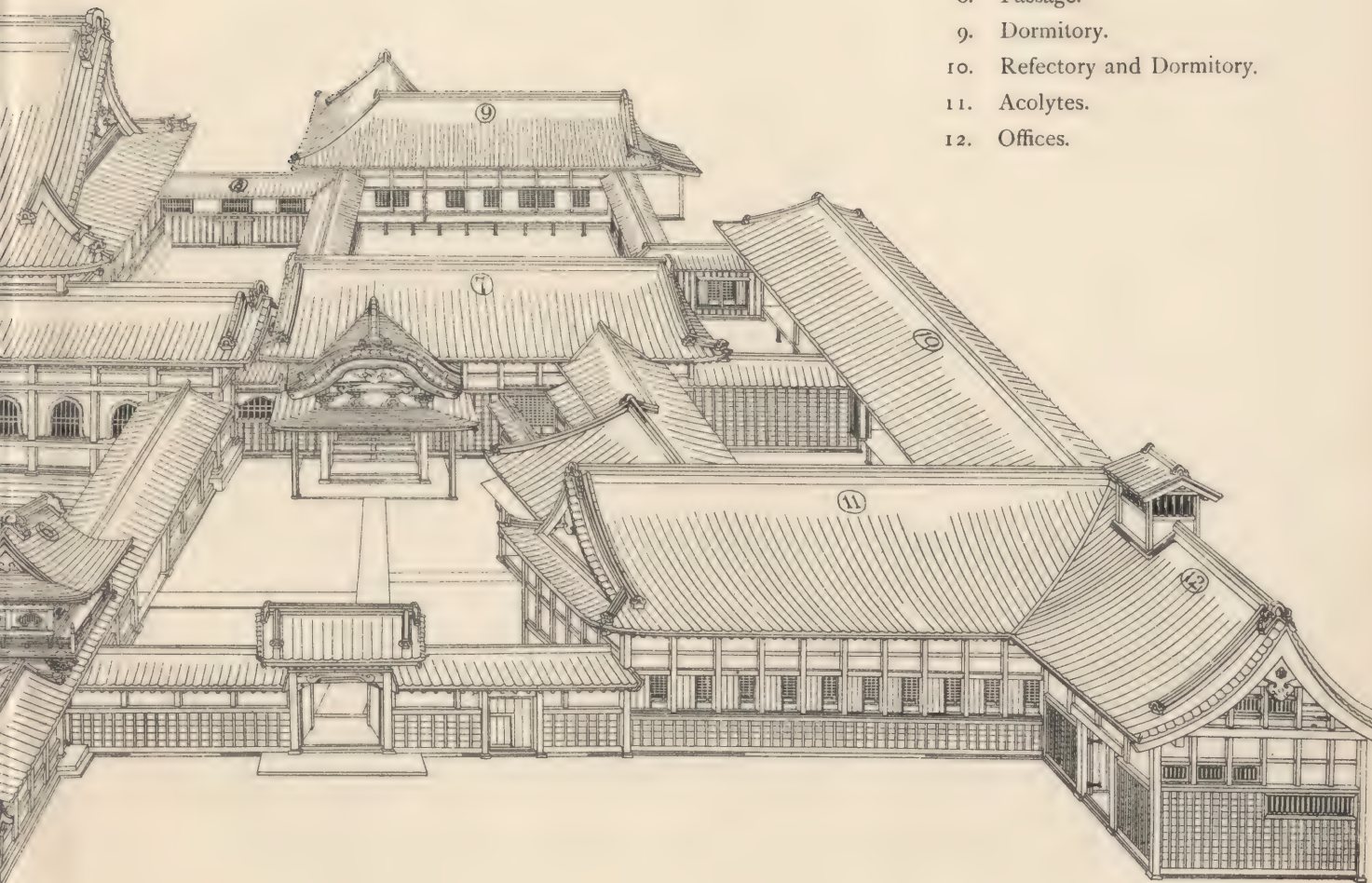


R.T. Conder del. for lith.

BIRDS-EYE VIEW OF A BUDDHIST TEMPLE

[REDUCED FROM A DRAWING]

- 7. Hospitium.
- 8. Passage.
- 9. Dormitory.
- 10. Refectory and Dormitory.
- 11. Acolytes.
- 12. Offices.



T MONASTERY OF THE SHIN-SHIŪ SECT.

C.F.Kell, Photo-Litho. Castle St Holborn, London, E.C.

ING BY A JAPANESE ARTIST.]



grandeur and magnificence of proportion. In Japan, we find in these and certain other apartments the exactly opposite impression of surpassing tinyness, worked out with almost equal success.

MONASTERIES.

The monasteries consist of a numerous collection of separate residences for small companies of cenobites, differing little in the interior from large domestic dwellings, except in being divided into a number of smaller rooms lighted by small barred windows in place of the ordinary moveable slides. In this way more privacy and severity are obtained. The lower rooms, used for assembly and study, are provided with recessed windows, the recesses having raised window seats used for writing upon. The Abbot's residence is generally more ornate than the others, having a certain amount of decorative art in the ceilings and wall slides, and similar to what we have just described as the Bishop's Palace. In connection with the monasteries are often large cemeteries for the illustrious dead. The most remarkable instance is at the monastery of Koya, a favourite refuge formerly for deposed or abdicated monarchs, which contains cenotaphs of several of the Mikados and of many notable personages. The central establishments of each sect serve as seminaries for the teaching of the particular doctrines of their founder, as well as for public worship; and within the precincts of such temple grounds, or sometimes lining the approach, are the houses of the cenobites. Such monasteries, or more correctly speaking, monastic temples, are mostly romantically situated in raised wooded positions with extensive grounds, and, in some cases, magnificent gardens surrounding them. Kyôto, the former capital, abounds in monasteries of historical interest belonging to the different sects, and is rich in objects of antiquity and art. The general arrangement of these buildings is shown in a bird's-eye view of the monastery of the Shin-Shiû sect [Illustn: lxv.].

JOSIAH CONDER.

THE MAUSOLEUM AT NIKKO.

Compiled by ROGER T. CONDER, *Associate (Soane Medallist, 1881).*

IN attempting to describe the Mausoleum of Iye-Yasu,—the first Shogun of the Toku-gawa dynasty,—at Nikko [Illustn. liii.], I have put together the various items of information contained in my brother's writings, and have supplemented this information with descriptions by myself of the various outline and water-colour drawings and photographs which he has sent me. I have in addition made extracts (printed between inverted commas) from the description of this mausoleum given in the Guide-book to Japan.⁸⁸

The temple buildings are placed in three main enclosures—an arrangement common to most eastern temples and *mausolea*—formed on the side of the hill, each enclosure being reached through a gateway, approached by a flight of stone steps.

“Ascending some broad steps between two rows of cryptomeria, planted on stone-faced banks, we

⁸⁸ See *A Handbook for Travellers in Central and Northern Japan*, with maps and plans, by Mr. Ernest Mason Satow and Lieut. Hawes. 8o. Yokohama, 1881.

"come to the granite *tori-i*, or Shintō archway—presented by the Prince of Chikuzen, from his own quarries, in the year 1618. Its total height is 27 ft. 6 in., and the diameter of the columns is 3 ft. 6 in." "On the left is a five-storeyed pagoda of graceful form, painted in harmonious colours. It rises to a height of 104 ft., and the roofs measure 18 ft. on each side." It is one of the rare examples of a decorated pagoda. The exterior is coloured red, with the exception of the bracketing, which is picked out in various colours, most of the members being bordered with a white outline. The *kaeru-mata*, between the groups of brackets of the lowest storey, are filled with painted carvings of the signs of the Zodiac, namely, Bull, Mouse, Wild Boar, Dog, Cock, Monkey, Goat, Horse, Serpent, Dragon, Hare and Tiger. The portion of the central post in the lower storey is lacquered and has a shrine and images built round it; a ceiling is formed here, which, with the internal pillars and beams, is polychromatically decorated.

"From the *tori-i*, a pavement 40 yards long leads to the bottom of the steps crowned by the "Ni-ō mon, or Gate of the two Kings [Illustrn. liii., No. 3]. The two gigantic figures which formerly occupied the niches, right and left on the outside of the gate, have been removed, and their places given to a pair of gilt monsters called Ama inu and Koma inu, which probably are intended to represent lions. The carvings which adorn this gateway are extremely varied. On the tops of the pillars at the four external angles are *baku*, or tapirs, representations of which are supposed in China to act as charms against pestilence. The heads on the central pillars of the two outer ends of the structure are lions; in the niches, right and left of the lion at one end, are unicorns, and in the corresponding niches at the other end are fabulous beasts called *taku jiu*, which are endowed with the power of speech, and only appear in the world when a virtuous sovereign occupies the throne. The doorways are adorned with elephants' heads, the first portico has *kara shishi* (lions), with the tree-peony flower (*botan*), and the second has tigers. The interiors of the niches on the outside of the gateway are decorated with tapirs and groups of tree-peonies, those on the niches on the inside with bamboos. The carvings of tigers under the eaves, on the interior side of the gateway, are extremely good. Passing through the gateway, the visitor finds himself in a courtyard, raised high above the approach, and enclosed by a timber wall painted bright red. The three handsome buildings arranged in a zig-zag are storehouses, in which various utensils used at the religious ceremonies performed in honour of Iye-yasu's memory, pictures, furniture, and other articles used by him during his lifetime, and generally all the treasures belonging to the temple are usually kept" [Illustrn. liii., Nos. 5, 6, 7]. "The third is remarkable for two curious painted carvings of elephants in relief in the gable of the nearest end, which are ascribed to Hidari Jin-go-rō, a left-handed sculptor, the drawings having been made by the celebrated artist Tan-yu. It will be noticed that the joints of the hind legs are represented bent in the wrong direction." The lower portion of this building is made of logs of timber, splayed both ways to an edge on the outside—laid horizontally, and bound with vertical rows of gilt metal fittings, elaborately ornamented. This mode of building appears to be a revival of the ancient log-hut style, and the general effect is that of a rustic basement. The undersides of the splays, being in shade, give a rich variety of tone to the otherwise perhaps startling appearance of the vermilion red with which the whole is coloured. The gable barge-board, of a pale ashen grey, is ornamented with metal fittings, elaborately cusped, and in common with the quaint pendentives gilt; whilst the underside of the rafters is coloured vermilion. The wall space of the gable, divided by a central post and two carved ties into two portions, is most elaborately coloured and gilt, whilst the elephants, one white, the other a brownish grey, placed one in each compartment of the gable end, add to the general impression of refined barbaric splendour. The roofs of these storehouses, of a rich purple grey, relieved by masses of gilding on ridges, finials, and rafter and tile ends, give the complementary colour to the brilliant red of the building, and masses of luxuriant foliage form the background to these buildings. A row of stone lanterns, in front of these storehouses, follows the zig-zag line shown on the plan. The temple courts are crowded with these pillar monuments in great variety—some of stone, others of bronze, generally about five or six feet high, with an octagonal or spherical hollow head, and a crowning roof intended to contain lights burnt to the departed. Those of bronze are the finest, and have exquisite cast ornaments and gilding; the stone lanterns are generally of granite, with fine mouldings and carving.

On the left of the paved approach, which turns sharp round to the left on reaching these storehouses, is a tenantless stable, containing one large stall and a room for an attendant priest—originally intended for the accommodation of a pony kept for the service of the presiding deity, and regarded with the same reverence as the white cow of India. The gable is decorated with carvings and metal work, and the

wall panels are filled with carvings of different kinds of monkeys, said to be the monkeys of three countries, India, Japan and China [Illustrn. liii., No. 4].

After passing this building, the pathway again turns sharp round to the right, and hence leads, under another *torii*, through two gateways, and up several flights of steps to the mortuary chapel.

The Holy-water shed [Illustrn. liii., No. 8] stands on twelve granite columns, carrying lintols also of granite. The construction is essentially ligneous, and the granite is encased with quaintly cusped and enriched metal fastenings, at the junction of the members, in the same manner as in buildings made entirely of wood. Above the granite lintol is the usual decorated bracketing, carrying in the front a deep cambered beam, beautifully decorated with an arabesque representing the peony; the spaces beneath this beam and above it, and between the underside of the roof timbers, are beautifully carved and decorated—the former space being filled with a representation of water, the latter being filled with two winged dragons, one on each side of the central post. The roof is finished in a beautifully carved and convex-headed gable at front and back—the ridge terminal being slightly set back from the edge of the gable, and the tiles of the roof are curved down from the flat curve of the roof to the double curve of the gable, in such a way as to blend the two lines together in the most graceful manner.

The building beyond, the “Kio-zo” [Illustrn. liii., No. 10], “is the depository for a complete collection of the Buddhist scriptures (*is-sai-kiō*) which is contained in a fine revolving octagonal cupboard, with “red lacquer panels and gilt pillars.” This is a beautiful building, erected on a stone basement about 2 ft. high. It is about square on plan—the lower storey having a lean-to roof, hipped at the four angles, the clerestory, set back from the front walls of the lower storey, being covered with a pyramidal roof, finishing in a large bronze finial set upon a large square base. The whole is beautifully decorated, and the windows are good examples of Japanese windows, with raised frames, moulded and enriched with metal, finishing at the crown in a curved and cusped form. On the inside of this building the frieze panels of the clerestory are decorated with *ten-nin* playing upon musical instruments. These *ten-nin*, or angels, often represented in religious buildings, have the long hair gear and jewelled ornaments of ancient Chinese (also Japanese) ladies. The clothing is also that of Chinese ladies, arranged in flowing and fluttering lines, and the addition of numerous fluttering bands gives the idea of aerial motion.

After passing under another *torii*, a flight of steps gives access to the next court, which is bordered with a stone parapet built as though the material were wood. In this court stand “a bell-tower of “beautiful workmanship and decoration [Illustrn. liii., No. 13], a bronze candelabrum, presented by the “King of Loochoo [No. 11], and a bell given by the King of Korea, called the Moth Eaten Bell. . . . “On the left stand a bronze lantern from Korea [No. 11], a candelabrum from Holland, a drum-tower “[No. 12], no unworthy companion to the bell-tower opposite, and behind these again a temple originally “dedicated to the Buddhist god Taku-shi Nio-rai.” This building appears to be now used as a “residence by the priests in charge. [No. 14].

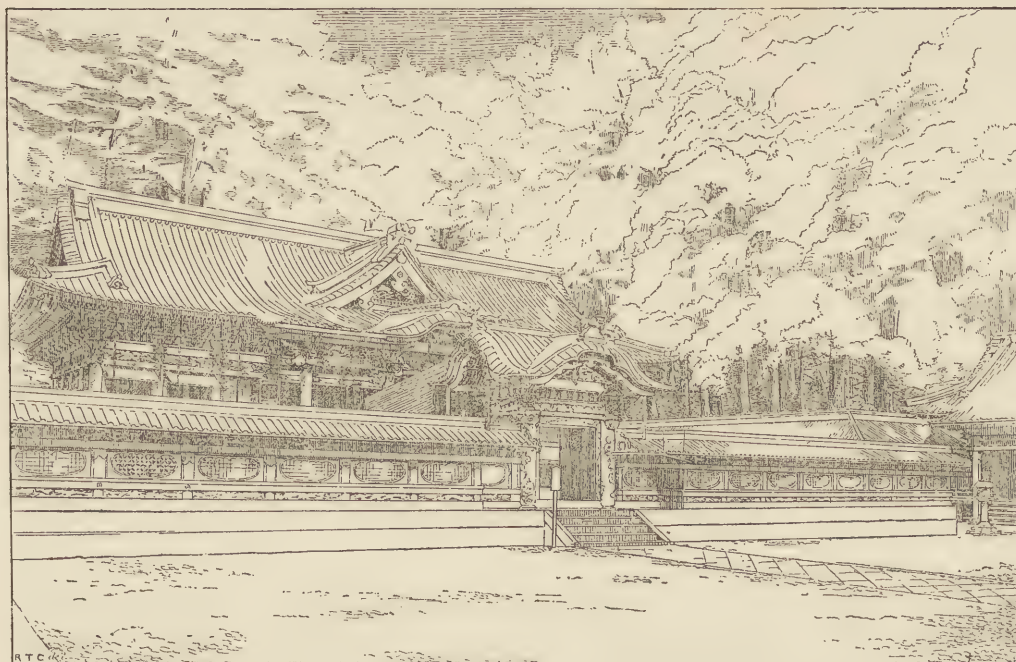
Another flight of steps leads up to the Yo-mei mon gateway. [Illustrn. liii., No. 15]. This is a two-storeyed structure of imposing appearance, and covered from top to bottom with carved and coloured ornamentation. On plan it consists of a central and two side openings—the two latter railed off, and each again divided into two compartments—those on the outside “contain the images called Sadaijin “and Udaijin, armed with bows and carrying quivers full of arrows at their backs; the inner niches “have a pair of Ama inu and Koma inu.” The main posts of the structure are coloured white, richly diapered with a small pattern, and are encased at their feet with richly ornamented bronze shoes, resting on moulded stone bases. The rails, partitioning off the spaces occupied by the statues, are secured to the main posts by means of ornamental bronze fittings. The flanks of the gateway are filled in between the posts with richly coloured carvings. The posts support a deep beam, running all round the gateway, on which are carved *Shishi*, bosses also representing *Shishi* being placed over each of the main posts. The junction of the heads of the posts and the beams which they support are covered with irregularly shaped bronze fittings, richly ornamented, binding the beams together, and hiding possible gaping joints. Another small moulded member is placed over these latter beams, and from this member starts a most elaborate system of bracketing, the top central member of each group consisting of the carved head and the claws of a grotesque animal. Between each group of bracketing are carved groups of Chinese figures, a somewhat rare example of the employment of representations of the human figure in Japanese structures. This bracketing supports a richly ornamented balustrade and gallery—the posts being capped with bronze—the panels between being irregularly cusped,

and filled with rich carving of flowers and birds, &c. The panels in the front are filled with carvings of children at play. The upper storey is supported on posts similar to those below, supporting another deep and richly ornamented horizontal beam, from which springs another complicated system of bracketing, supporting the roof timbers, in each group of which is carved the grotesque head of a fabulous animal. The roof of this gateway is the usual hipped gable roof, with low, elliptical-shaped gables on each side, and with huge ridges, hips, and gable terminals, arranged in such a way as to soften the harsh lines of the simple hip-gabled roof. The barge-boards have carved pendentives, and are ornamented with metal fittings. The eaves of the roof have a very considerable projection in front of the walls of the building, the undersides being, as usual, ornamented with a system of false rafters. The wall spaces of the upper storey are filled with richly curved, cusped and moulded frames, ornamented with representations of the sacred phoenix.

This gateway gives access to the second main enclosure (thirteen steps above the court below), surrounded on three sides by the cloister shown on the plan, and on the fourth by a lofty stone wall built against the face of the hill. The wall-space of each compartment of this cloister is divided horizontally into three unequal panels, filled with beautiful carvings of birds, animals and flowers, realistically coloured. The posts, ties and brackets, are also elaborately coloured. The cloisters end in hip gables, set back a short distance from the gateway, the intervening space being filled on each side of the gateway with a lobby, roofed at a lower level than the main roof. In this cloister "the Buddhist priests used formerly to repeat their prayers when assembled for the two great annual festivals." After passing the gateway, the building on the left is for "containing the cars carried in procession on the first of June, when the deified spirits of Iye-yasu, Hide-yoshi and Yoritomo are supposed to occupy them." [Illustrn. liii., No. 19]. On the right, the building nearest the gate is the Kagura-Den, or dancing stage [No. 17]. The other building, called Goma-dô [No. 18], was an altar for burning the fragrant cedar while prayers were recited. The wall posts, ties, &c., of the cloister are coloured on the inside of the enclosure, as well as on the outside, the posts being vermilion, the ties and lintols decorated with a key-pattern in light colours, and the ends of the roof rafters cusped and gilt.

The Kagura-Den is square on plan, and my brother's drawing shows it to be most elaborately decorated. It is surrounded by a balustraded gallery, supported by upright posts—the whole coloured vermilion, relieved by the gilt metal clasps and ornaments placed at the junction of the various members. The building itself, each side of which is divided into three compartments, of which the central is the largest, is approached by a flight of steps in the centre of the side farthest from the gate. The main posts of the building, and the lattice frames between, which are boarded at their back, and made to form, when closed, the walls of the structure, are coloured (or lacquered?) black, the frames and folding doors being ornamented with enriched and gilt metal clasps and fastenings. The main posts of the structure are carried up beyond and through the first horizontal beam, to support a second very much deeper horizontal member—the heads of the posts, and their junction with this beam, being encased with highly enriched metal fastenings; in the case of the posts, this metal takes the form of the *gohei* hangings, so often represented at the top of posts and pillars. From the head of each post starts an elaborate decorated group of bracketing, supporting a third main horizontal member. These three main beams are decorated in light colours—the lowest with flowers and curling stems upon a cream-coloured ground—the intermediate beam with a geometrical pattern of which the two chief colours are blue and yellow—upon a light delicate green ground, the upper beam having a delicate red diaper upon a white ground. Of the panels left between the posts and the horizontal members, the lowest are filled with carvings of the peony, realistically coloured, the centre of each of these panels having a huge flower coloured a rich crimson—the panels above the intermediate beam have decorated *kaeru-mata*—supporting a curved cove, extending from the wall to the underside of the upper horizontal beam. The ribs of this cove are gilt, the spaces between being black. The false rafters, underneath the wide-spreading eaves, are coloured black, their ends being tipped with gilt metal, the ends of the tile rolls and the metal fittings on the eaves fascia being also gilt. The roof has one ridge, two gables, and four hips—the barge-boards of the gables being very deep and heavy, bound with elaborate gilt metal fittings, the wall space of the gable itself being elaborately carved, and painted in subdued colours. A bell hangs from each corner of the roof.

Within the enclosure in which this dancing stage and the other two buildings mentioned stand, is the Tama-gaki, or last and chief enclosure, containing the mortuary chapel. The Tama-gaki is in



THE TAMA-GAKI OR PRINCIPAL ENCLOSURE AND THE MORTUARY CHAPEL.

the form of a rectangle, 125 ft. long from end to end of the approach front, and 155 ft. deep from front to back. It consists of timber framing, filled with carved panels and open gilt trellis-work, surmounted by bracketing and crowned with a tile roof. The whole is most elaborately coloured. In the centre of the approach front stands the Kara-mon, which is another, and the last, elaborately decorated gateway before reaching the chapel. [Illustrn. liii., No. 20]. Here, again, the posts are light in colour, supporting bracketing, richly-decorated horizontal cambered beams, and a massive roof; the intermediate spaces are filled in with bold carving, the lowest panel consisting of Chinese figures. The roof consists of a ridge, from side to side, and four curiously curved and trefoil-headed gables. Huge dragons disport themselves on the ridge. Beyond this gateway are the porchway and entrance steps of the mortuary chapel [No. 21]. The oratory of this building is very similar in general arrangement and mode of construction to the Temple of Miyo-Jin, Kanda [Illustrn. lii.], though in this case there is no external loggia. The spaces between the posts are filled with the usual lattice frames, boarded at the back. "The folding doors of the oratory are beautifully decorated with arabesques of *botan* flowers in gilt relief; over the door and windows of the front are nine compartments filled with birds carved in relief, four on each side of the building, and there are four more at the back, on each side of the corridor leading to the chapel. The interior is a large matted room, 42 ft. long by 27 ft. deep, with an ante-chamber at each end. That on the right, which was intended for the head of the Toku-gawa family, contains pictures of Ki-rin, on a gold ground, and four carved oaken panels 8 ft. high by 6 ft. wide. The subjects are the Chinese phoenix variously treated, and appear at first sight to be in low relief, but on closer examination it will be discovered that the figures are formed of various woods glued on to the surface of the panel, a suspicion of which is naturally excited by a quantity of false brass-headed nails, which do not add to the beauty of the work. The rear compartment of the ceiling is carved wood, the Toku-gawa crest in the centre, surrounded by phoenixes in different attitudes, and groups of chrysanthemums. The opposite ante-chamber has the same number of panels, the subjects of which are eagles very spiritedly executed, and a carved and painted ceiling, the subjects on which are chrysanthemums round an *apsaras* in the centre." The decoration of the wall posts, lintols, bracketing, and coved ceiling of the oratory is elaborate. The wall posts, up to within about 2 ft. of the first horizontal beam, are gilt, the upper portion being decorated with the *go-hei* pattern. Above this

first beam the post is continued to the underside of the beam which carries the bracketing, and is encased at the top with a gilt metal ornament, the upper portion of the post being decorated with gold arabesques and powderings of coloured flowers on a deep-blue back-ground. The lowest of the three horizontal members is halved on to the wall posts, and secured with a large ornamental-headed nail in the centre of a gilt metal ornament. This beam is coloured a geometrical pattern in blue, yellow, red and white upon a delicate green ground. The junction of the intermediate horizontal members with the posts is hidden with ornamental gilt metal clasps, which are a continuation of the ornamental metal head of the posts. This beam is decorated with pheasants, realistically painted in brilliant colours, flying amidst flowers, leaves, and curling stems, conventionally arranged, the whole being painted on a delicate green ground. The panels between the lower and this horizontal member have raised borders lacquered black, with gilt metal clasps and ornaments enclosing carvings of birds in trees, water, &c., painted in subdued colours and gilt. The top horizontal member rests directly upon that last described, and is painted red, with a band of white in the centre, enriched with balls of gold. The bracketing, which starts from this member, is lacquered black with gold edgings, a very unusual method of decorating bracketing in this position. The spaces between the groups of bracketing are filled with beautiful carvings of pheasants, phoenixes, birds, and animals, amidst conventional foliage and tree trunks, coloured with intense realism in the brightest colours. The ceiling which this bracketing carries is divided by small ribs, arranged in couples, into large square panels; the ribs enclose long narrow panels, and at their junction are small square panels. The ribs are lacquered black, and are encased with richly ornamented and gilt metal clasps at their junction with one another. The ground of the ceiling is a delicate green. The centres of the large square panels are decorated with blue medallions containing dragons, outlined in black and gilt, the spandrils of these panels and the long narrow panels between the ribs being ornamented with powderings of conventional flowers, and cloud masses in gold and colour, outlined with a white edge. "The gold paper *go-hei* at the back of the oratory and a circular mirror are the only ornaments left, the Buddhist furniture of bells, gongs, books of prayer, and so forth, having been removed when the pure Shintō form of worship was introduced. Two wide steps at the back lead down into the 'stone chamber' (*ishi-no-ma*), so called because it is paved with stone under the matted wooden floor. The ceiling is divided into square panels with gold dragons on a blue ground. Beyond are the gilt doors of the *hon-den*, or chapel, containing four apartments, to which access is not obtainable. The first, called the *hei-den*, where the offerings are presented, is a beautifully decorated chamber having a coffered ceiling, with phoenixes very diversely designed, and carved beams and pillars of plain wood. In it stand a gilt *go-hei*, offered on behalf of the Mikado, and a silken one presented by himself on the occasion of his visit to Nikko in 1876. The last probably contains an *i-hai*, or monumental tablet inscribed with the name Tō-shō-gū, by which Iye-yasu was deified."

The tomb of Iye-yasu [Illustn. liii., No. 28] is at the rear of the whole group of buildings, and is reached through the Kokaku-mon gateway by the long winding flight of steps shown on the plan [No. 24]. The gateway is a very curious construction. The lower part, entirely white, slopes inwards towards the top and is crowned with a deep frieze, painted a deep red colour, from which starts an elaborate system of many-coloured bracketing. The ends of the projecting rafters, the ridges and terminals, &c., are gilt. The opening itself is formed of a timber framing, rounded at the two top corners, and encased with gilt metal. The mortuary chapel at the top of the hill, reached through another *tori-i*, is that of the third Shogun Iye-mitsu, who died in 1657. "The tomb is a single bronze casting of a light colour, produced, it is said, by the admixture of gold, and has exactly the same shape as those in the same material of the later Tycoons at Shiba. In front stands a low stone table, bearing an immense bronze stork with a brass candle in its mouth, an incense burner of bronze, and a vase with artificial lotus flowers and leaves in brass. The whole is surrounded by a stone wall, surmounted by a balustrade, the entrance being through a bronze gate (not open to the public), the roof of which, as well as the gate itself, is a solid casting. Before it sit bronze Koma inu and Ama inu." The tomb itself is a vault underneath the monument.

ROGER T. CONDER.

XXII.

PRESENTATION OF THE ROYAL GOLD MEDAL, 1886,

To CHARLES GARNIER, Member of the Institut de France, *Hon. Corr. Member.*

[Presented on Monday, 21st June 1886, Edward I'Anson, F.G.S., *President*, in the Chair.]

THE PRESIDENT.—Gentlemen, We are met together this evening to perform an agreeable duty, the most important part of which is to present the Royal Gold Medal for architecture, the gift of Her Most Gracious Majesty The Queen, to the chosen recipient for the year, Mr. Charles Garnier, whom we have the great satisfaction of seeing amongst us.

Most if not all of those whom I have now the honour to address are acquainted with the Opera House of Paris. Still it may not, on this occasion, be uninteresting to recall to our minds that truly magnificent work,³⁹ which, since its completion, has been accepted as the model for all similar monuments erected in Europe. There are others which no doubt vie with, and even surpass it, in costliness of material, such as the St. Isaac's Church at St. Petersburg, the Medici Chapel at Florence, but there are none which in my recollection combine so much artistic work with such costliness of material.

The construction of this great work occupied thirteen years. Mr. Garnier gave his entire and unremitting attention to it, and, aided by several zealous assistants, produced the prodigious number of more than 30,000 drawings. No less than fifteen eminent painters, fifty-six eminent sculptors, besides nineteen sculptors of ornament, were engaged on its external and internal decorations.

Gentlemen, it is Mr. Garnier's rare fortune to have been the architect of one of the grandest and most original buildings of our time. It has also been his good fortune to practise in that Capital, aptly likened to ancient Athens, where art is keenly appreciated by the public,—and, moreover, is substantially acknowledged by the State,—

³⁹ The President here entered into statistics of the size of Opera Houses in Berlin, St. Petersburg, and Vienna, and compared them with the Paris Opera House, the superficial area of which is 11,337 square metres, equalling about 122,000 square feet (English), or an area of nearly three acres. The cubical contents of the Paris House amount to 428,660 cube metres, as compared to the Vienna House, which amount to 222,777 metres; the St. Petersburg House, to 114,288; and the Berlin House, to 35,000.

where the national appreciation of operatic performances is evinced by the noble Theatre which the liberality of his fellow countrymen has enabled him to erect.

There is also a reason for emphasizing our welcome of Mr. Garnier. He comes to us in a high representative character, and perhaps on this account, Gentlemen, I may be permitted to express your pleasure as well as my own at seeing here this evening Sir Frederic Leighton, P.R.A., our illustrious chief of the arts in this country. Mr. Garnier is not only a great architect, but this year, in France, he is the authorised representative of the arts of painting, sculpture, architecture, engraving, and musical composition—the President of the Académie des Beaux-Arts, one of the five Academies which compose the Institut National de France. He represents, and illustrates in a practical as well as a moral capacity, an academic system older and more extended than our own, and he has profited by a method of education peculiar to the French people and eminently national—a method, to say the least, which is more careful in its character and aims than is our own. A pupil in the *atelier* of Hippolite Lebas, who was an Hon. Corr. Member of our Body in 1835, Mr. Garnier was received as a student of the École des Beaux-Arts in 1842, and he obtained, at the early age of twenty-three, the *Grand Prix de Rome* for architecture. Thereby he earned the right to be received for four or even five years at the Académie de France at Rome, as the Government student. During that period he was enabled to visit the principal cities of Italy, and to make a prolonged stay in Greece. His *études* of the ancient buildings were duly sent to Paris and approved. In 1852 his admirable restoration, consisting of fourteen drawings, of the Temple of Jupiter Panhellenius at Egina, was finished, and it has since been published, at the cost of the French Government, in the great work entitled *Restaurations des monuments antiques par les architectes pensionnaires de l'Académie de France à Rome depuis 1788 jusqu'à nos jours*, and still in progress. Though he returned a short time afterwards to France, it was not until 1861, at the age of thirty-six, that he commenced the labours of his more mature professional life. Elected in 1874 one of the eight architect-academicians pertaining to the Académie des Beaux-Arts, he has been just called to the presidentship, it being this year the turn of the *Section d'Architecture* to preside over those of Painting, Sculpture, Engraving, and Musical Composition.

Mr. Garnier, Sir, having reference to your career, to the fact that you obtained in your early years the *Grand Prix de Rome* for architecture, that you have distinguished yourself in Rome, in other parts of Italy, and in Greece, and that the great work of the Opera House of Paris is the honourable result of a double competition with other architects who were practising in your artistic city, and that you moreover fill the position of President of the Académie des Beaux-Arts: we, having these facts before us, came to the conclusion that we could not more appropriately show our appreciation of your high qualities, and of the great work you have carried out, than by recommending our Sovereign to confer this Medal upon you; and it must be gratifying to you to know that, in this honour, your name will be henceforth associated with the names of distinguished countrymen who have preceded you, as recipients of the Medal: with Jacques Ignace Hittorff, in 1855; Jean Baptiste Lesueur, in 1861; Eugène

Emmanuel Viollet-Le-Duc, in 1864; Charles Texier, in 1867; Joseph Louis Duc, in 1876; and the Marquis de Vogüé, in 1879—all but the last-named being now deceased.

Sir, it remains for me to say, in placing this Medal in your hand, that it affords us the greatest pleasure to welcome you here on so interesting an occasion as the present, and I esteem it a great privilege that, in virtue of my official position as President, I am permitted to present to you this Medal, which on the recommendation of this Institute our Most Gracious Sovereign allows us annually to offer to some distinguished architect or man of science, of any country, who by his labours has tended to promote or facilitate the knowledge of architecture, or the various branches of science connected therewith.

And now, Gentlemen, for myself, if I may still trespass a little longer on your attention, I will add that I have been from my youthful days a warm admirer of modern French architecture, particularly that of Paris of which I have naturally seen most, and my study and appreciation of which has, I think, sensibly and beneficially influenced many of my own works. I have, moreover, very personal reasons which invest France with a sentimental interest for me, and it affords me, therefore, exceptional pleasure to welcome our *confrère* here this evening, not only on account of his honourable and dignified position as a distinguished artist, but also as a citizen of a country the genius of whose architects we admire, and with whom we are living on terms of brotherly friendship and mutual esteem, reciprocally communicating the particulars of our labours, and the results of our studies.⁴⁰

CHARLES GARNIER, President of the Académie des Beaux-Arts (Institut de France), *Hon. Corr. Member*.—Messieurs et chers confrères, mon émotion est grande en répondant au discours si élogieux de notre honorable Président; elle est d'autant plus grande que, malgré la sympathie qu'il m'a montrée et que vous voulez bien aussi me témoigner, je crains de ne pouvoir exprimer suffisamment tous les sentiments que cette sympathie m'inspire et tout le prix que j'attache à l'honneur que vous m'avez fait. S'il en était ainsi, si je vous parlais mal de ma reconnaissance, c'est qu'il y a des choses qui sont moins faciles à dire qu'à ressentir au fond du cœur. Et pourtant, mes chers confrères, je voudrais bien que vous pussiez être convaincus de toute ma gratitude; elle n'est pas, je vous assure, indigne de votre bienveillance et, je l'espère du moins, de la médaille d'or que vous venez de me décerner.

Cette médaille, qui réunit sur elle le nom de Sa Majesté la Reine Victoria et celui de l'Institut Royal des Architectes Britanniques, est au dessus de tout autre honneur, et est considérée partout comme la plus haute et la plus enviable distinction; aucun n'oserait en discuter la valeur; aucun n'oserait en méconnaître la portée. Quant à moi,

⁴⁰ The President then read a telegram he had received from A. N. Bailly, Member of the Institut de France, *Hon. Corr. Member*, which was thus worded:—"Paris, 21 Juin, 11.20 a.m. To l'Anson, Président, "Institut Royal Architectes Britanniques. Bailly, Président, Société Centrale Architectes, Paris, empêché de se rendre à l'invitation si courtoise de l'Institut Royal, charge Paul Sédille, Vice-Président, de transmettre à Charles Garnier les cordiales félicitations de ses confrères de la Société Centrale, et d'offrir à l'Institut Royal des Architectes Britanniques les sentiments de gratitude des architectes Français pour la Médaille d'or de Sa Majesté la Reine Victoria remise en ce jour à un architecte Français.—BAILLY, "Membre Honoraire de l'Institut Royal, 19, Boulevard Bonne Nouvelle, Paris."

je la place où elle doit être, c'est à dire dominant tout autre insigne. Elle ne vient pas seulement du bon plaisir des donataires, elle vient d'une société indépendante qui, sans prévention, sans parti pris, va trouver celui qui paraît devoir mériter ses suffrages. Les artistes n'ont pas de portefeuilles à conserver ni d'électeurs à ménager ; ils n'ont que leur conscience à satisfaire. Alors quand ils choisissent un de leurs pairs, celui-là peut être glorieux du choix. Laissez-moi donc, mes chers confrères, laissez-moi être fier d'avoir été désigné par vous ; laissez-moi croire que votre décision a bien atteint le but que vous vous proposiez.

D'ailleurs ma personnalité seule n'est pas engagée par votre résolution ; vous avez été plus haut et plus loin dans votre hommage. En distinguant à nouveau un architecte Français, vous avez voulu honorer encore et la France et l'architecture ; vous avez laissé de côté les exigences politiques des peuples, ou plutôt celles de leurs gouvernements, et cela, sans autre préoccupation que d'aller directement à l'art et de le soutenir de toute votre autorité. C'est ainsi que votre jugement a été compris par l'Institut de France et par la Société Centrale des Architectes, et c'est ce qui fait que votre médaille d'or est devenue chez nous si respectée et si désirée.

Il me semble que cette appréciation doit également vous toucher. En grandissant, s'il le peut, cette distinction, en lui donnant une valeur si particulière, n'est-ce pas grandir aussi ceux qui en disposent et donner une valeur suprême à leurs décisions ? Je ne saurais donc jamais placer trop haut une récompense venant de vous puisque, plus j'élèverai mon honneur, plus j'élèverai en même temps le vôtre.

Au surplus, les faits sont là, les applaudissements qui m'ont salué sont allés vers vous, non pas seulement de façon intentionnelle, mais encore de façon déclarée ; et les architectes Français n'ont pas laissé passer cette occasion d'adresser leurs sympathiques remerciements à leurs confrères Anglais. L'union des artistes s'est ainsi faite à ce sujet et chacun s'est rencontré en une cordiale confraternité ; aussi en vous offrant l'hommage de ma gratitude, je suis loin d'être isolé dans un témoignage que je me plais à considérer comme une mission que je viens accomplir au nom de tous.

Mais il est deux autres motifs qui me sont plus personnels et sur lesquels je vous demande la permission de dire un mot.

Il y a bien longtemps déjà, je revenais de Rome, ayant terminé mon séjour de pensionnaire à la Villa Médicis, et, comme cela arrivait bien souvent à cette époque, je revenais sans aucune ressource, sans travaux et sans grande espérance d'en avoir bientôt. Je me trouvais donc dans un grand embarras.

Sur ces entrefaites, S.M. la Reine Victoria vint à Paris ; un bal lui fut offert à l'Hôtel de Ville, et le Préfet, voulant que la Reine conservât le souvenir de cette soirée, fit faire un grand album représentant les vues de tous les salons et galeries du monument. Je n'étais pas trop maladroit en aquarelle, et l'on me proposa d'en exécuter deux pour cet album ; vous pensez si j'acceptai cette bonne aubaine qui me valut le premier argent que je gagnais depuis mon retour.

Je n'oubliai pas cette circonstance et, sans qu'elle s'en doutât naturellement, je me plus à considérer votre Reine comme ma première cliente, ou, tout au moins, comme la

cause de ma première clientèle. Elle a dû me porter bonheur ; car, depuis lors, j'ai pu, tant bien que mal, faire mon chemin dans les arts.

Plus tard, c'était en 1867, je reçus un jour une lettre signée de M. Donaldson, et qui commençait ainsi :—" Les membres de l'Institut Royal des Architectes Britanniques *se sont fait l'honneur* de vous nommer membre correspondant," etc. Je trouvai la formule des plus courtoises et bien digne d'être retenue (et vous voyez que je la retiens), et je fus tout charmé en même temps que tout étonné que l'on ait ainsi pensé à moi en pays étranger. Je commençais donc à prendre rang parmi les artistes !

Depuis ce temps je fus nommé membre correspondant de bien des académies ; mais, sans méconnaître la valeur de tous ces nouveaux titres, c'est toujours le premier, celui qui m'avait été décerné par votre Institut, qui m'est resté le plus cher et le plus précieux.

Vous voyez bien, mes chers confrères, que j'ai de grandes raisons pour aimer l'Angleterre, puisque le premier argent que j'ai gagné et le premier honneur que j'ai reçu viennent de vous, et que la dernière et suprême distinction qui m'est échue a la même origine. On dirait presque que vous vous êtes chargés de moi, et que, m'ayant ouvert le chemin, vous avez voulu me conduire jusqu'au bout. À cela ne faut-il pas encore ajouter cette cordiale réception d'aujourd'hui, où vous m'avez traité, non seulement en confrère, mais même en ami ? Gardez-moi ce dernier titre ; c'est peut-être celui qui m'est le plus doux au cœur.

Je ne sais si ma carrière d'artiste est terminée et s'il me sera donné encore de mettre tout mon dévouement au service de l'art ; mais, si telle chose arrivait, si après les édifices que j'ai construits je devais en construire un autre, il me semble que celui-là serait peut-être irréprochable ; car j'aurais dans mon labeur la certitude que vous m'encourageriez d'ici et que votre pensée viendrait me retrouver. D'ailleurs ne suis-je pas à présent des vôtres et n'ai-je pas le devoir de me montrer digne de vous ? Cela suffirait pour stimuler mes forces, pour agrandir mes idées et pour ne pas laisser déchoir en mes mains l'honneur attaché à la grande médaille d'or de S.M. la Reine Victoria.

Et maintenant, mes chers confrères, pardonnez-moi ces paroles, peut-être un peu longues à entendre, mais qui seraient encore trop courtes, si je voulais y mettre tous mes sentiments d'affection et de reconnaissance.

SIR FREDERIC LEIGHTON, Bart., President of the Royal Academy ; *Associé Étranger* of the Institut de France ; *Hon. Associate*.—I much fear, Mr. President, that it may seem presumptuous and even almost impertinent in the individual, to whom in your excellent address you alluded incidentally, but in too indulgent terms, to rise and speak, however briefly, here on the occasion of a ceremony of which he is only one of very many spectators, and on the subject of the award of a medal in determining which he has had neither part nor share. But I have been given to understand, Sir, that such is your wish, and your wish here is my command ; I obey it. Well, Sir, I stand here in the position of one who owes a double allegiance. I owe allegiance first to you, as the respected President of a Society of which I am happy to be an Hon. member ; I owe allegiance also to the famous architect on whom all eyes are turned this evening, and who, as you have reminded us, is at the present

time President of that Academy of the Institut de France, of which it is my great pride to be an Associate. And, indeed, I rejoice to have this opportunity of proffering my loyal respect to one who so well fills a post so conspicuous. Since you have permitted me to express an opinion on the subject before you, I would venture to say that this Institute has done well in recommending to Her Majesty The Queen to confer this great distinction on the highly gifted architect of the *Grand Opéra* of Paris. It is not for me here to recite his claims and to recall his works, for that has been done abundantly and exhaustively by your President. He has himself, with native grace and eloquence, expressed his sense of the honour that has come to him from his comrades beyond the sea, and you, I venture to say, have added a worthy name to the long and distinguished muster-roll of this Institute. But there is in this award more, I think, than a tribute of respect to a considerable personality. This, indeed, is foreshadowed in the concluding passages of your address; this also is hinted in the eloquent words of Monsieur Garnier himself; it seems to me that you have desired to express that great debt under which all the world of art is laid by the genius of the great nation to which Monsieur Garnier belongs. That debt is, I think, patent over the whole field of art, but nowhere, perhaps, is it more conspicuously manifest than in the field of architecture. If you consider the inexhaustible profusion, the no less inexhaustible variety, with which the builder's art has adorned the sunny breadths of that favoured land: whether you turn to its civil architecture or to its ecclesiastical architecture, whether you consider that phase of art which, in the south and in the west of France, reveals to us Latin severity and sobriety linked with Celtic fire, or whether, in the north, you observe that superb evolution of the Frankish spirit which during three centuries lit up mediæval Europe,—whether you consider the ornate stateliness and elegance of the châteaux of the Loire, or the regal splendours of the buildings of the *Grand Siècle*,—you will alike feel how vast is the fund of wealth which has been poured into the common treasure by this singularly brilliant people. And, certainly, I am bold to say that no one in this room could join with a more deep conviction or with a more grateful impulse in the honour you have paid to French art, in the person of one of its foremost representatives, than myself. [Sir Frederic Leighton then turned towards Monsieur Garnier.] *Et vous, cher confrère et très-honoré Président, souffrez que je joigne mes félicitations toutes personnelles et très-chaleureuses aux paroles officielles que vient de prononcer le Président de céans au sujet d'un honneur qui, j'aime à le dire, rejaillit sur ceux qui le décernent non moins que sur vous qui le recevez.*

[Extract from a Communication by Charles Lucas, *Hon. Corr. Member.*]

Peut-être ne sera-t-il pas sans intérêt de faire connaître à nos confrères Anglais les titres littéraires que M. Ch. Garnier joint à sa valeur comme architecte, et d'indiquer rapidement ici les publications auxquelles il a collaboré ainsi que ses écrits personnels.

C'est par centaines (plus de sept cents) qu'il faut compter ses rapports administratifs ou ses études de polémique artistique depuis le jour où, après son retour de Rome, il

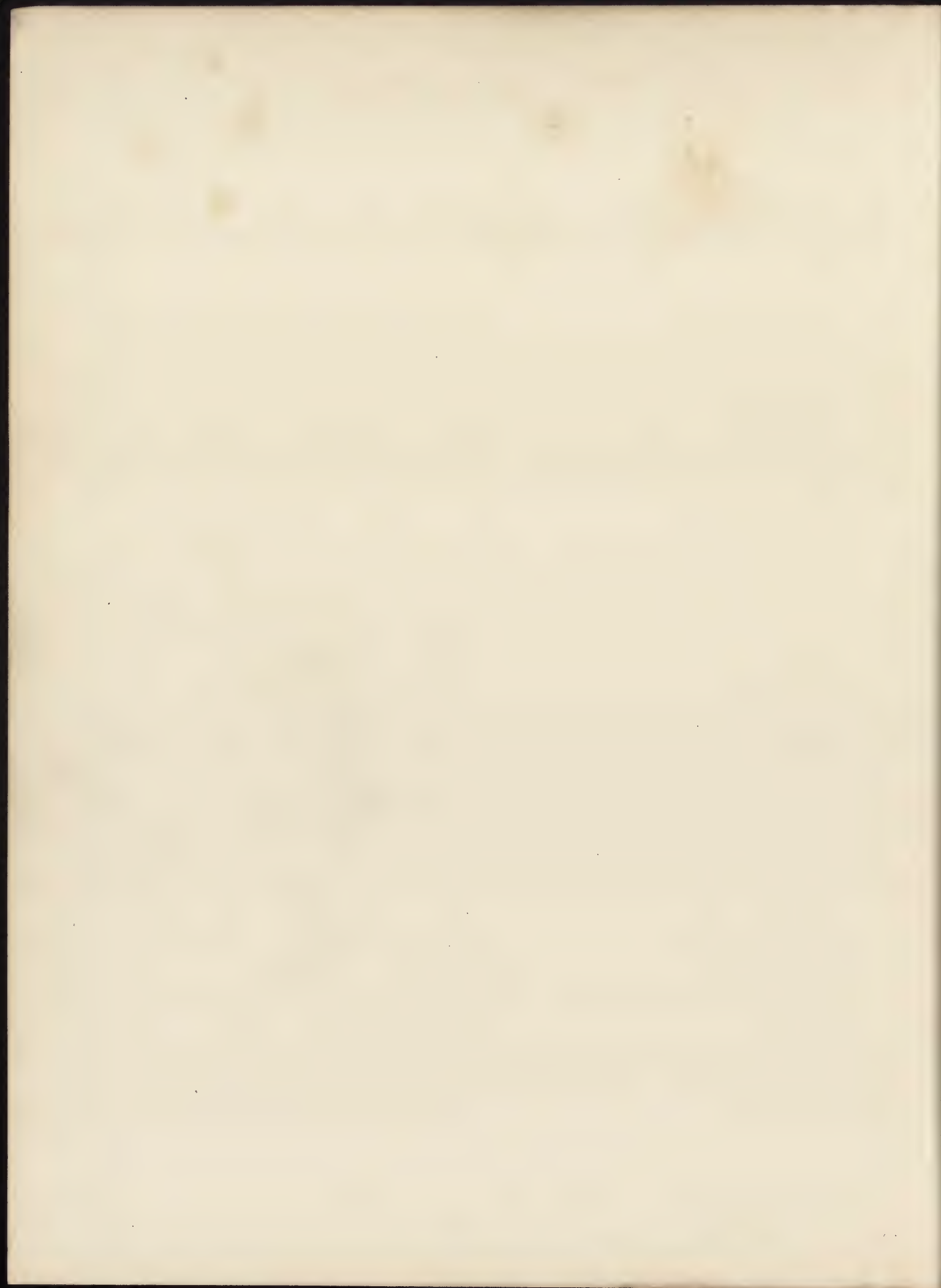
entra comme auditeur au Conseil général des Bâtiments civils, dont il fut nommé en 1877 l'un des quatre Inspecteurs-généraux, et il est plus difficile encore d'énumérer les nombreux articles (avec ou sans illustrations) que M. Ch. Garnier donna, pendant ces trente-cinq dernières années, à la *Revue générale de l'Architecture et des Travaux publics*, à la *Revue archéologique*, au *Dictionnaire de l'Académie des Beaux-Arts* (Institut de France), au *Dictionnaire encyclopédique des Sciences et Arts*, à la *Gazette des Beaux-Arts*, à la *Science pour Tous*, au *Musée des Sciences*, à la *Revue de l'Orient et des Colonies*, à la *Revue Dramatique*, au *Ménestrel*, ou à des journaux quotidiens comme le *Moniteur universel*, le *Temps*, le *Figaro*, le *Gaulois*, le *Constitutionnel*, le *XIX^{me} Siècle*, le *Courrier municipal*, etc. ; nous détacherons cependant de cet ensemble ses *Études sur l'île d'Égine*, le *Guide du Jeune Architecte en Grèce*, sa *Notice sur Victor Baltard*, ses *Comptes-rendus des Salons annuels*, son *Compte-rendu de l'Exposition Universelle de 1867*, sa polémique avec M. Trélat sur *l'Enseignement et les Tendances de l'École spéciale d'Architecture*, la *Chaire du Moyen-âge à l'École des Beaux-Arts*, les *Affiches agaçantes*, les *Difformités de la Nature morte et de la Nature vivante*, le *Tout Paris des premières*, et le *Métropolitain dans ses Rapports avec la Physionomie et les Antiquités de Paris* (ce dernier Rapport donné, avant son voyage à Londres, à la Société des Amis des Monuments Parisiens dont il est Président).

Comme ouvrages d'archéologie ou d'architecture il faut citer :—

1. *La Restauration des tombeaux des rois angevins en Italie* (54 planches in-fol. trait et couleur) ;
2. *À travers les Arts*, 1 vol. in-12°, 1868 (Hachette) ;
3. *Le Théâtre*, 1 vol. in-8°, 1876 (Hachette) ;
4. *Le nouvel Opéra*, 2 vol. in-fol., texte et planches (Ducher & Cie.) ;
5. *L'Île d'Égine, Restauration du Temple de Jupiter Panhellénien*, 1 vol. in-4°, texte et planches (Didot).

Enfin, M. Ch. Garnier, membre de nombreux Instituts, Académies et Sociétés diverses, est un poète fécond et rempli d'*humour*, et c'est là un côté particulier de son caractère et de son talent que nous n'aurions pas voulu laisser ignorer à ses confrères de l'autre côté du canal le jour où ils lui décernent la médaille d'or de S.M. la Reine Victoria.

CHARLES LUCAS.



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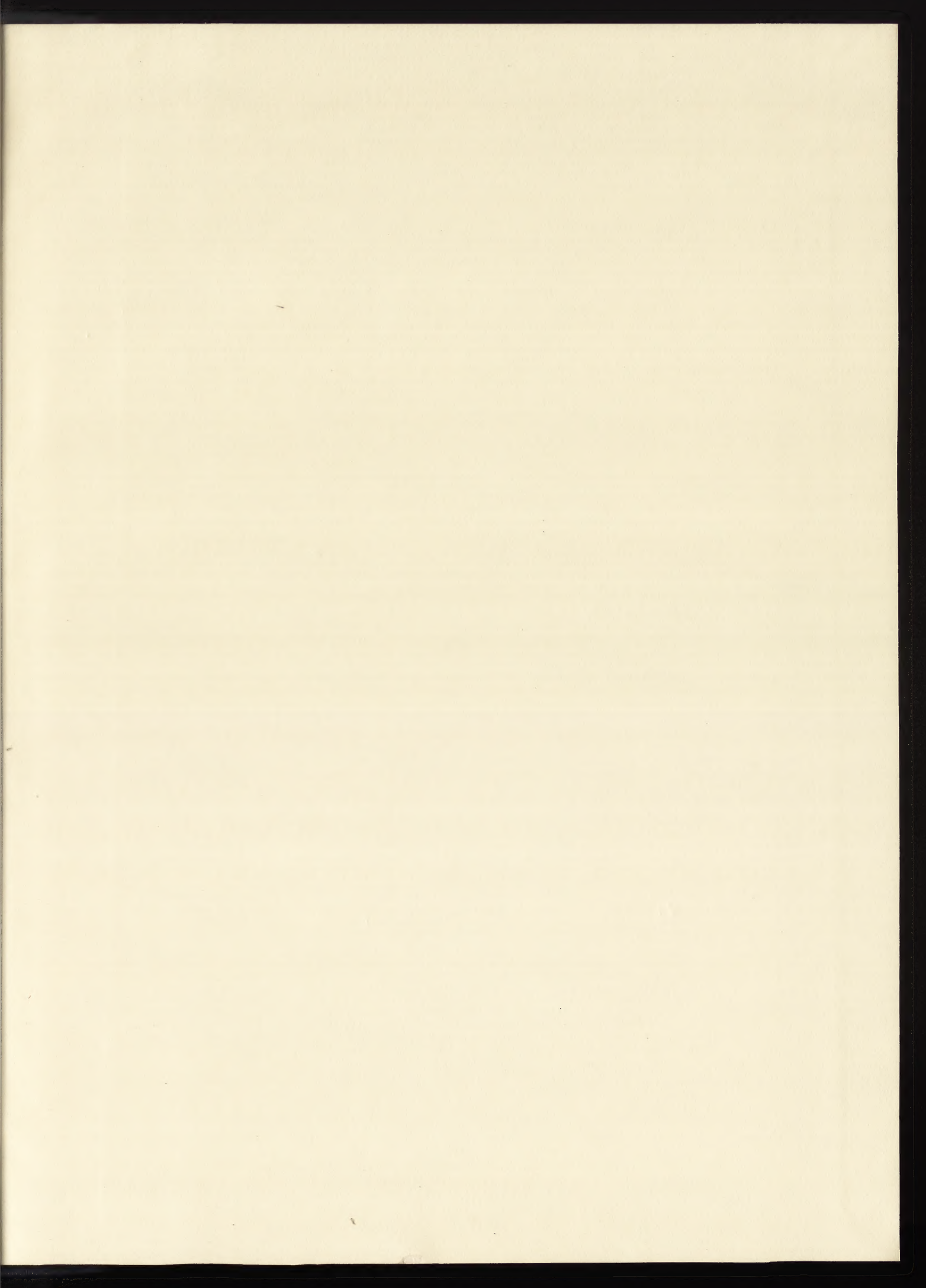
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